

Assay

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY^{1/}

Core samples from Humble Oil & Refining Company's Jumps Cabin corehole No. 1
drilled in NW1/4SW1/4SW1/4 (910 ft N/S and 470 ft E/W) sec 15,
T 4 S, R 98 W, Rio Blanco County, Colorado

Surface elevation: 7,596 feet
Mahogany marker: 381.4 feet
Cored interval: 275.0-1,175.5 feet

From	To	Description
275.0	277.0	Oil shale: Medium to dark grayish brown, slightly calcareous. Moderately distinct to faint laminae; common fine to small loop structures in upper part. A very fine diagonal calcite-filled fracture in upper part; a 1/4-inch fracture with buff earthy mudstone filling and some calcite in lower 0.4 foot. Rare very fine dark gray pyritic streaks.
277.0	278.0	Oil shale: Grayish brown to tan, calcareous. Faint streaked bedding to moderately distinct laminae; common very fine loop structures. A fine displaced gray analcite lamina with common fine cavities at 277.2. A 1/4- to 1-inch vertical fracture filling of buff earthy to silty mudstone passes along edge of core through most of interval; fine calcite seam with some short open sections between mudstone and oil shale; some irregular fractures in mudstone filling; most of fracture filling is in unsampled part of core.
278.0	280.1	Oil shale: Dark to some medium grayish brown and rare tan, slightly calcareous to dolomitic. Moderately distinct streaked bedding; rare thin tight horizontal folds. Mudstone fracture filling continues through upper foot. Some fine to very small milky quartz blebs in lower part.
280.1	281.0	Oil shale: Medium and rare dark grayish brown to tan and buff, calcareous. Faint to moderately distinct laminae; common fine loop structures and displacements. Some fine white to buff crystalline streaks near top; a 1/4-inch low angle white to brown crystalline seam with very fine flat elongate cavities at 280.4. A 1-inch stringer of tan very fine sandy-textured dolomite (?) with very irregular nonconformable contacts at 280.3. Irregular fractured core pieces at base. Sample of very thin white to brown crystalline seam from 280.4 feet: X-ray - calcite.
281.0	283.7	Oil shale: Dark to medium grayish brown, calcareous to dolomitic. Moderately distinct to faint laminae and streaked bedding; some fine loop structures. Very rare fine white crystalline laminae.

^{1/} By L. G. Trudell, completed July 17, 1969

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Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of medium to dark laminated oil shale from 281.6 feet: X-ray - dolomite, quartz, calcite, feldspar, analcite.
283.7	285.7	Oil shale: Medium brown to tan and buff, calcareous. Distinctly laminated; very common fine loop structures. A 1-1/2-inch band of light to medium grayish-brown fine sandy-textured calcareous tuff with abundant very fine black bitumen specks at 284.4. A fine buff marly stringer with very small dark gray silty blebs at 285.4.
		Sample of tuff from 284.4 feet: X-ray - analcite, Na feldspar, calcite, quartz, dolomite.
285.7	286.7	Oil shale: Tan and buff to some medium brown, calcareous. Moderately distinct to faint laminae; very common fine loop structures and displacements. Some irregular tight high angle fractures with slight white coatings. A fine white to brown crystalline seam at 286.5 (like 280.4 feet).
		Sample of tan to buff marlstone from 286.5 feet: X-ray - quartz, dolomite, feldspar, calcite.
286.7	287.0	Missing?
287.0	287.5	Oil shale: Medium to rare dark brown, dolomitic. Faint to moderately distinct laminae; common fine loop structures.
287.5	289.0	Oil shale: Very dark grayish brown, dolomitic. Faint laminae and streaked bedding.
		Sample of oil shale from 288.0 feet: X-ray - dolomite, quartz, calcite, analcite, feldspar.
289.0	290.0	Oil shale: Dark to medium grayish brown, dolomitic. Faint streaked bedding to some moderately distinct irregular laminae. Some very fine irregular calcite-filled fractures; some open fractures and vuggy limonite-stained parting surfaces with drussy quartz at 289.6-289.8.
290.0	292.0	Oil shale: Dark to rare medium grayish brown, dolomitic to calcareous. Faint streaked bedding. Some very fine buff-white streaks at 291.5.
292.0	294.0	Oil shale: Dark to medium grayish brown, calcareous. Faint laminae and streaked bedding. A fine diagonal calcite-filled fracture in upper 6 inches. A thin irregular diagonal stringer of brown to buff dolomite (?) from 292.8 to 293.2.
294.0	297.3	Oil shale: Medium to some dark grayish brown and some tan to buff, calcareous to slightly calcareous. Fairly distinct to faint laminae; some fine loop structures and displacements. Few <u>very</u>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		fine calcite-filled fractures. A very thin white to tan crystalline calcite seam at 296.2.
297.3	298.3	Oil shale: Very dark grayish brown to some medium brown, rare resinous black streaks and laminae; dolomitic. Faint laminae and streaked bedding; rare fine to very small loop structures. A diagonal fracture with slight white to blue-gray coatings in middle.
298.3	299.3	Oil shale: Dark to some medium grayish brown, slightly calcareous. Faint to moderately distinct laminae in upper 0.3 foot; very faint streaked bedding in lower part. Fine tuff streaks and stringers as below in thin zones at 298.6 and 298.7.
299.3	300.0	UPPER WAVY BED. Tuff and oil shale: Grayish-brown to tan, silty to granular dolomitic tuff with thin interbedded zones and fine included streaks of oil shale as above and below. Sample of grayish-brown tuff with fine oil-shale streaks from 299.5 feet: X-ray - quartz, analcite, calcite, feldspar, dolomite.
300.0	303.1	Oil shale: Medium to dark brown and grayish brown, calcareous. Faint laminae and streaked bedding. A fine white crystalline calcite seam at 300.5.
303.1	304.4	Oil shale: Medium to very rare dark brown and grayish brown, calcareous. Faintly laminated. Sample of oil shale from 303.3 feet: X-ray - dolomite, calcite, quartz, analcite, feldspar.
304.4	305.8	Oil shale: Medium to some dark grayish brown and brown, calcareous. Moderately distinct to faint laminae and streaked bedding. A 3/4-inch vertical stringer of buff calcareous mudstone cuts through most of interval. Sample of mudstone stringer from 304.6 feet: X-ray - analcite, quartz, Na feldspar, calcite.
305.8	308.5	Oil shale: Medium to very dark grayish brown, calcareous. Faint to moderately distinct laminae and streaked bedding. Buff mudstone stringer continues through most of interval (mostly in unsampled part of core); contorted in upper part.
308.5	310.6	Oil shale: Dark to medium grayish brown, calcareous. Faint to some moderately distinct laminae and streaked bedding; some fine loop structures and displacements. Very abundant fine irregular calcite-filled fractures at 308.7-309.3; rare in other

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		parts. A thin irregular diagonal brownish-gray silty stringer in lower 0.3 foot. A 1/4-inch white to very pale yellow-gray crystalline seam at base.
310.6	311.6	Sample of calcite seam from 310.6 feet: X-ray - calcite. Oil shale: Dark grayish brown, dolomitic. Faintly laminated; common fine loop structures. Two fine diagonal calcite-filled fractures in upper part.
311.6	313.6	Oil shale: Dark to medium grayish brown and brown, calcareous. Faint to distinct laminae with some fine loop structures; some very faintly bedded zones.
313.6	316.7	Oil shale: Medium brown, some dark in upper and lower parts; calcareous. Faintly laminated to very faintly bedded. Very common fine irregular calcite-filled fractures at 314.9-315.1; rare in other parts. A 1- x 1-1/2-inch vug on edge of core at 315.4 with fine platy boxworks and drusy crystals.
316.7	317.7	Sample of drusy boxworks from vug at 315.4 feet: X-ray - calcite; some dolomite, quartz, analcite, feldspar. Oil shale: Dark to medium grayish brown, calcareous. Very faint laminae and streaked bedding. Rare fine gray pyritic (?) streaks.
317.7	320.0	Oil shale: Medium grayish brown, some dark in lower part; slightly calcareous. Moderately distinct to very faint laminae; some fine loop structures in upper part. Some fine gray to buff silty crystalline streaks and blebs at 317.9 and 319.8. Rare very fine high angle calcite-filled fractures. A very thin white calcite layer at 318.8.
320.0	321.2	Sample of oil shale with fine gray to buff silty streaks and blebs from 319.8 feet: X-ray - dolomite, fluorite, analcite, quartz, Na feldspar, pyrite. Oil shale: Very dark to rare medium grayish brown dolomitic. Very faint laminae and streaked bedding.
321.2	323.2	Oil shale: Dark to medium grayish brown, slightly calcareous. Faint laminae and streaked bedding. A thin zone with common very fine buff to gray blebs at 322.9.
323.2	324.2	Oil shale: Medium and some dark grayish brown, slightly calcareous. Faint to moderately distinct laminae; some fine loop structures and displacements. Rare fine gray to buff streaks and blebs. Rare insect larvae. A very fine horizontal calcite-filled fracture at 323.5.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
324.2	325.2	Oil shale: Medium and rare dark grayish brown to tan and buff, dolomitic. Faint to distinct laminae; some very fine loop structures. Rare very fine black pyritic streaks. Some very small buff silty crystalline lenses at 324.3. Rare insect larvae.
325.2	326.4	Oil shale: Medium to some dark and light grayish brown, dolomitic to slightly calcareous. Moderately distinct laminae; rare fine loop structures. Some fine gray silty crystalline streaks and lenses in upper part. A fine pinch-and-swell stringer of dense brown dolomite (?) with brownish-gray to buff silty crystalline blebs at 325.6. Sample of dense brown stringer with silty blebs from 325.6 feet: X-ray - analcite, quartz, Na feldspar, dolomite.
326.4	328.2	Oil shale: Medium and some dark grayish brown to tan and buff, calcareous. Very distinct to some faint laminae; common fine loop structures and displacements. Rare insect larvae. A very fine high angle calcite-filled fracture in lower half. Sample of very distinctly laminated buff to dark grayish-brown oil shale from 327.2 feet: X-ray - dolomite, quartz, analcite, feldspar.
328.2	329.5	Oil shale: Very dark to rare medium grayish brown, some slightly satiny black laminae; slightly calcareous. Faintly laminated; some fine to small loop structures and displacements. Rare fine to small dark brownish-gray silty crystalline streaks and lenses. Rare insect larvae.
329.5	330.5	Oil shale: Dark to medium grayish brown, slightly calcareous to dolomitic. Faint laminae and streaked bedding; rare fine loop structures.
330.5	331.6	Oil shale: Very dark to medium grayish brown, slightly calcareous. Moderately distinct laminae; rare fine loop structures.
331.6	334.0	Oil shale: Medium to some dark grayish brown, some tan to buff at 332.1-332.4; slightly calcareous. Moderately distinct and some very distinct laminae; common fine loop structures. Some very small light gray to buff silty lenses at 332.5. Some fine partly open high to low angle calcite-filled fractures.
334.0	334.9	Oil shale: Medium to dark grayish brown, slightly calcareous. Faint laminae and streaked bedding. Very rare fine gray pyritic streaks. A 3/8-inch diagonal calcite-filled fracture at base.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
334.9	335.5	Oil shale: Very dark to rare medium grayish brown, dolomitic. Faintly laminated.
335.5	336.5	Oil shale: Dark grayish brown to black, common satiny to rare resinous luster; dolomitic. Faintly laminated; some fine to small loop structures. A fine horizontal white crystalline calcite seam at 336.4. Sample of oil shale from 335.9 feet: X-ray - dolomite, quartz, analcite, calcite, feldspar, pyrite.
336.5	337.7	Oil shale: Dark to rare medium grayish brown, dolomitic. Faint laminae and streaked bedding.
337.7	339.0	Oil shale: Dark to medium grayish brown, dolomitic to calcareous. Faintly laminated to some massive. Very rare very fine dark gray pyritic streaks.
339.0	340.0	Oil shale: Medium to dark brown and grayish brown, slightly calcareous. Faint laminae to very faint streaked bedding. Very rare pyritic streaks. Sample of brown oil shale from 339.7 feet: X-ray - dolomite, calcite, quartz, analcite, feldspar.
340.0	341.5	Oil shale: Medium to very dark grayish brown, slightly calcareous. Faint laminae and streaked bedding; some fine loop structures. A very fine horizontal calcite seam at 340.9.
341.5	342.7	Oil shale: Medium to some dark grayish brown, slightly calcareous. Faint to fairly distinct laminae; common very fine loop structures. Rare fine gray silty streaks and very small lenses. Rare very fine low angle calcite-filled fractures.
342.7	343.7	Oil shale: Medium and some dark grayish brown to tan and buff, calcareous. Distinctly laminated; very common very fine loop structures and displacements. Rare fine gray silty streaks.
343.7	344.7	Oil shale: Medium to dark brown and grayish brown, calcareous. Distinctly laminated; common fine to small loop structures. Rare fine gray streaks and lenses.
344.7	345.3	Oil shale: Dark grayish brown to black, some satiny to resinous luster; dolomitic. Faintly laminated; common fine to small loop structures. A very thin light brownish-gray to buff silty lens at 344.9, and a fine to thin stringer at 345.1. Two fine horizontal calcite seams at 345.2. Sample of light brownish-gray silty lens from 344.9 feet: X-ray - Na feldspar, quartz, analcite, pyrite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAYS

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
345.3	347.8	Oil shale: Dark grayish brown, some medium grayish brown to rare tan in lower part; slightly calcareous. Faint to rare distinct laminae; some fine loop structures and displacements. Rare fine black pyritic streaks. Some small gray silty lenses at 345.6. A fine tan to buff silty stringer at 346.7.
347.8	348.8	Oil shale: Medium to some dark grayish brown and some tan, slightly calcareous to dolomitic. Distinct to some faint laminae; common fine to 1/4-inch loop structures and displacements. Rare fine dark gray pyritic streaks.
348.8	349.5	Oil shale: Very dark grayish brown to black with very common very fine brown to tan dense blebby laminae and streaks, some resinous to waxy luster; dolomitic. Distinctly laminated; some fine to small loop structures. Very regular thick to thin shaly parting. A very regular 1/4-inch gray silty lamina at 348.9. Sample of gray silty lamina from 348.9 feet: X-ray - Na feldspar, pyrite.
349.5	350.0	Oil shale: Very dark grayish brown, dolomitic. Very faint streaked bedding and some laminae. Sample of oil shale from 349.8 feet: X-ray - dolomite, quartz, analcite, calcite, feldspar.
350.0	350.9	Oil shale: Very dark grayish brown to medium brown, slightly calcareous. Distinct to faint laminae; common very fine loop structures and displacements. A fine gray pyritic streak near base.
TOP OF A-GROOVE		
350.9	354.4	Oil shale, very lean: Tan and buff to some medium and very rare dark brown, slightly calcareous to dolomitic. Distinctly laminated; fairly common fine loop structures. Very regular thick to rare thin parting. Very rare very fine dark gray pyritic streaks. A fine discontinuous white stringer at 353.8.
354.4	355.5	Oil shale: Medium to dark brown and grayish brown, dolomitic. Moderately distinct laminae to faint contorted streaked bedding. Very common very irregular open fractures and some very coarse to fine vuggy breccia. A 2-inch stringer of dense massive tan to buff dolomite (?) with common fine irregular cavities at base. Uneven sample split.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of tan to buff dolomite (?) from 355.4 feet: X-ray - dolomite, quartz, feldspar, analcite.
355.5	356.4	Missing.
356.4	358.0	Oil shale: Medium and rare dark brownish gray to buff and gray buff, some brown to tan near top; dolomitic. Distinct to some faint laminae; rare very fine loop structures and displacements. Very regular thick to rare thin parting. Some high angle fractures with very fine scattered pyrite.
358.0	361.0	Marlstone: Buff and gray buff to some light and rare medium brownish gray, dolomitic. Faint to moderately distinct laminae; rare fine loop structures and displacements. Very regular thick to rare medium and thin parting. Some very fine dark gray silty pyritic (?) streaks. Some medium to high angle fractures with very fine pyrite near top.
		Sample of gray-buff marlstone from 359.6 feet: X-ray - dolomite, K feldspar, quartz, pyrite.
361.0	361.9	Marlstone and very lean oil shale: Gray buff to light and some medium grayish brown. Faint to some fairly distinct laminae; rare to common very fine loop structures. Rare very fine dark gray silty pyritic streaks and laminae. Very regular flat to slightly curved, thick to thin parting.
		BASE OF A-GROOVE
361.9	362.2	Missing.
		TOP OF MAHOGANY ZONE
362.2	363.7	Oil shale: Medium to rare dark grayish brown and brownish gray, dolomitic. Moderately distinct to very faint laminae; some very fine loop structures. Regular thick to medium parting. Fairly common fine to thin dense brown dolomite laminae and streaks. Platy limonite-stained boxworks with some fine dull black blebs on parting surface at top.
363.7	364.3	Oil shale: Dark brownish gray, dolomitic. Faint streaked bedding. Rare fine brown dolomite streaks.
		Sample of oil shale from 364.2 feet: X-ray - dolomite, quartz, feldspar, analcite, illite, ferroan, pyrite.

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Core samples from Humble Oil & Refining Company's Jumps
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From	To	Description
364.3	365.2	Oil shale: Dark and some medium grayish brown to black, common resinous to some waxy luster; dolomitic. Faint to some distinct laminae; common fine to small loop structures. A very irregular large brown dolomite inclusion near top and a fine grayish-brown lamina at 364.8. Some fine grayish-brown to yellowish-buff silty tuff (?) laminae and streaks. Sample of dark oil shale with fine tuff (?) streaks from 364.7 feet: X-ray - Na feldspar, dolomite, quartz, pyrite, analcite, illite.
365.2	367.5	Oil shale: Medium to rare dark grayish brown and rare tan to buff, dolomitic. Faint to distinct laminae; very common fine to small loop structures. Rare thin to fine yellowish-buff tuff streaks as above; a 2-inch yellowish-buff to light gray and white silty tuff at 366.0; some very small to fine, gray to buff, silty to dense lenses and streaks in lower part. Sample of light gray to white silty tuff from 366.0 feet: X-ray - analcite, quartz, feldspar.
367.5	368.6	Oil shale: Medium and some dark grayish brown to some tan and buff, dolomitic. Distinctly laminated; some loop structures and displacements. Common thin to fine, buff-white to buff and light gray silty streaks and lenses; rare very fine medium to dark gray, dense to silty laminae. Rare short tight vertical fractures.
368.6	369.3	Oil shale: Medium to dark grayish brown, dolomitic. Fairly distinct to faint laminae; rare fine loop structures. Some thin to fine buff silty tuff streaks and lenses. A 3-inch fractured to finely brecciated zone in middle with very small to fine irregular cavities and some dull gray to black limonite-stained material. Smooth conformable contact between oil shale and tuff below.
369.3	369.5	Tuff: Gray buff to buff white, silty to very fine sandy textured, porous. Very wavy contact with oil shale below.
369.5	369.9	Oil shale: Dark and rare medium grayish brown to some black. Fairly distinct laminae. A 1-inch pinch-and-swell buff tuff at 369.6; some fine streaks and stringers near base.
369.9	370.2	Tuff: Buff, silty to very fine sandy textured, porous. Irregular wavy contacts at top and bottom.
370.2	370.4	Oil shale: Medium to dark brownish gray. Very common fine collapsed cavities. Common fine buff crystalline blebs and rare small porous drusy masses.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of porous crushed oil shale with fine crystalline blebs from 370.3 feet: X-ray - quartz, dolomite, feldspar, pyrite.
370.4	371.1	Oil shale: Very dark to some medium grayish brown, some fine black satiny laminae; dolomitic. Faint to moderately distinct laminae; very common fine to 1/2-inch loop structures. Some fine to thin brown to gray-buff tuff streaks and stringers.
371.1	372.2	Oil shale: Medium to some dark grayish brown and brownish gray, slightly calcareous. Moderately distinct laminae; rare fine to small loop structures. Some fine to thin, gray to buff tuff streaks and laminae in upper inch; rare in other parts.
		Sample of medium to dark brownish-gray oil shale from 371.7 feet: X-ray - dolomite, calcite, quartz, aragonite, feldspar, analcite.
372.2	372.6	Oil shale: Dark and rare medium brownish gray to black, some satiny and rare resinous luster, dolomitic. Moderately distinct to faint laminae. Regular thin to thick shaly parting. Rare very thin buff tuff laminae and streaks. A 1- x 2-inch very dark gray silty lens in middle; oil-shale laminae smoothly curved above and below.
		Sample of large dark gray silty lens from 372.4 feet: X-ray - Na feldspar, pyrite, dolomite, quartz, analcite.
372.6	373.2	Oil shale: Dark to medium brown and some black, dolomitic. Faint to some moderately distinct laminae and streaks. Rare fine dense brown streaks and blebs.
373.2	375.5	Oil shale: Medium to dark reddish brown and some black, dolomitic. Faint distorted streaks and stringers in upper part to faint and rare distinct laminae with common fine loop structures in lower part. Common fine brown to orangish-tan tuff (?) streaks at 374.1 to 374.3; sparse in other parts. A large mass of fractured to brecciated vuggy oil shale with limonite stains and some drusy crystals at 374.9.
		Sample of dark oil shale with brown to tan tuff streaks from 374.2 feet: X-ray - quartz, Na feldspar, analcite, calcite, pyrite, dolomite.
		Sample of medium reddish-brown oil shale from 374.7 feet: X-ray - dolomite, quartz, feldspar, calcite, aragonite, analcite.

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Core samples from Humble Oil & Refining Company's Jumps
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From	To	Description
375.5	377.8	Oil shale: Medium and rare dark grayish brown, dolomitic. Faintly laminated; some fine loop structures. Rare fine brown to tan tuff laminae and streaks in upper part. Very rare very fine gray silty laminae and streaks in lower part. A diagonal fracture with sparse very fine pyrite at 377.0.
377.8	381.4	Oil shale: Medium to dark grayish brown, some tan in middle part; dolomitic. Faint to some moderately distinct laminae; common fine loop structures. Some short tension cracks in tan laminae in middle part. Common small dark gray silty lenses in one horizon at 381.2 (like 372.4 feet). A very irregular thin tan to brownish-gray tuff stringer near base with a thin distorted stringer of lean oil shale below.
381.4	382.0	MAHOGANY MARKER. Tuff: Buff, massive, silty to very fine sandy textured. Some tight to open high angle fractures. Fairly regular conformable contact with oil shale below. Sample of tuff from 381.9 feet: X-ray - Na feldspar, analcite, quartz.
382.0	383.0	Oil shale: Medium and rare dark brownish gray to some buff, dolomitic. Fairly distinct laminae; some fine loop structures. Rare fine buff-white earthy to silty streaks and stringers.
383.0	384.0	Oil shale: Tan and buff to medium and rare dark grayish brown, dolomitic. Distinctly laminated; some fine loop structures. Some fine buff-white silty streaks and lenses at 383.8. Sample of oil shale with fine buff-white streaks from 383.8 feet: X-ray - dolomite, feldspar, quartz, analcite, fluorite, pyrite.
384.0	385.2	Oil shale: Tan to medium brown and some dark grayish brown, dolomitic. Distinctly laminated; rare fine loop structures and displacements. Rare fine buff-white streaks. A very thin buff to brownish-gray, earthy to blebby tuff stringer at 385.0.
385.2	385.8	Oil shale, very rich: Very dark brownish gray to black, nearly all has resinous luster; dolomitic. Faintly laminated; some fine to small loop structures. Some high angle fractures with fine pyrite blebs and patchy calcite crusts.
385.8	387.4	Oil shale: Dark to some medium brownish gray and grayish brown, dolomitic. Faintly laminated; common fine loop structures.
387.4	388.5	Oil shale: Medium grayish brown and brown to rare tan and buff, dolomitic. Faint and rare distinct laminae; common fine loop

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Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		structures. A high angle fracture with calcite and sparse pyrite passes through interval.
388.5	389.5	Oil shale: Dark grayish brown to some black, some satiny luster; dolomitic. Faint laminae to very faint streaked bedding.
389.5	391.4	Oil shale: Medium to dark grayish brown and some black, some brown to tan in lower 0.3 foot, some satiny to rare resinous luster; dolomitic. Faint to moderately distinct laminae. A large grayish-brown silty tuff nodule at 389.8. Some fine buff to brown, earthy to crystalline lenses near base. A high angle fracture with patchy calcite in lower 0.3 foot.
391.4	392.4	Oil shale, very rich: Dark brownish gray to some black, very common resinous to some waxy luster, dolomitic. Faintly laminated; common fine to small loop structures. Some short open fractures near top.
392.4	393.2	Oil shale: Dark to some medium brownish gray, dolomitic. Faintly laminated.
393.2	393.8	Oil shale, <u>very</u> rich: Very dark brownish gray to black, nearly all has resinous to waxy luster. Faintly laminated with some distinct brown to tan laminae; common fine to 1/2-inch loop structures.
393.8	395.2	Oil shale, very rich: Very dark to some medium brownish gray and some black, most has resinous to waxy luster; dolomitic. Moderately distinct laminae with very common small to 3/4-inch loop structures. Some dull black limonite-stained streaks and buff silty blebs in lower part.
395.2	396.4	Oil shale: Dark and some medium grayish brown to some black, very common satiny and rare resinous luster; dolomitic. Faintly laminated; common fine and some small loop structures.
396.4	397.0	Oil shale: Medium to dark brown and grayish brown, rare black, rare satiny luster; dolomitic. Faintly laminated; some fine to small loop structures. Rare fine brown silty blebs and streaks.
397.0	398.0	Oil shale: Dark brownish gray to black, common satiny to resinous luster; dolomitic. Faintly laminated; some fine loop structures.
398.0	401.6	Oil shale: Very dark to some medium grayish brown and rare black, rare satiny to resinous luster, dolomitic. Faintly laminated; some fine loop structures. A large irregular buff silty tuff nodule at 398.2.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
401.6	403.1	Oil shale, very rich: Dark brownish gray to black, very common resinous to waxy luster; dolomitic. Very faint laminae and streaked bedding. Irregular broken core pieces with calcite encrusted fractures in middle part; uneven sample split.
403.1	408.0	Oil shale: Dark brown and grayish brown to rare black, dolomitic. Faint laminae to very faint streaked bedding. Some fine horizontal calcite-filled fractures near top; some irregular open and calcite-filled fractures in slightly leached oil shale at 405.0-405.3.
408.0	411.0	Oil shale: Dark to medium grayish brown, dolomitic to slightly calcareous. Very faint streaked bedding and some laminae. Very rare fine brownish-gray silty crystalline streaks. A very fine horizontal calcite-filled fracture at 410.1.
411.0	413.0	Oil shale: Medium to some dark grayish brown, slightly calcareous. Rare fine brownish gray silty to dense streaks. Sample of oil shale from 410.7 feet: X-ray - aragonite, dolomite, calcite, quartz, feldspar.
413.0	413.9	Oil shale: Very dark grayish brown, some very fine satiny streaks; dolomitic. Faint streaked bedding. Very rare fine black pyritic streaks.
413.9	414.9	Oil shale: Dark to medium grayish brown, dolomitic. Faintly laminated; rare fine to small loop structures. Some very fine dark to medium brownish-gray silty to dense crystalline streaks and laminae in lower part.
414.9	416.9	Oil shale: Medium brown and grayish brown, dolomitic. Faint very fine laminae and streaked bedding. Common very fine lacy bitumen-filled fractures at 415.3-415.7. A small vug with papery radiating boxworks at 415.7. A very irregular discontinuous thin to fine resinous black pyritic stringer at 415.9. Sample of oil shale with black pyritic stringer from 415.9 feet: X-ray - pyrite; some feldspar, dolomite.
416.9	417.9	Oil shale: Dark grayish brown, very common satiny to resinous black laminae at 417.4-417.7; dolomitic. Faint laminae and streaked bedding; rare fine loop structures. Rare fine brown to dark brownish-gray silty crystalline streaks and blebs.
417.9	420.3	Oil shale: Medium and some dark grayish brown, rare tan to buff in lower part, very dark brownish gray with some black satiny streaks at 419.3-419.5; dolomitic. Faint to some moderately

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		distinct laminae; common fine loop structures. Some small buff silty lenses and fine streaks at 419.1. Common very short tension cracks in some lighter laminae.
420.3	421.0	Oil shale: Medium to dark grayish brown and rare black, dolomitic. Faint to moderately distinct laminae and streaked bedding; some fine loop structures. Few short tight irregular tension cracks in upper part.
421.0	422.0	Oil shale, very rich: Very dark brownish gray to black, most has satiny to resinous luster; dolomitic. Faintly laminated; some fine to small loop structures. Several fine to 1-inch, slightly earthy to silty buff tuff stringers in lower half. Sample of very rich black oil shale from 421.4 feet: X-ray - quartz, dolomite, feldspar, pyrite, illite, analcite. Sample of buff tuff from 421.7 feet: X-ray - Na feldspar, quartz, dolomite, pyrite, ferroan.
422.0	422.5	Oil shale: Dark to some medium grayish brown and rare black; dolomitic to slightly calcareous. Faintly laminated; common fine to small loop structures. A thin buff tuff stringer at 422.1.
422.5	423.8	Oil shale: Medium and some dark grayish brown; dolomitic to very slightly calcareous. Faint laminae to very faint streaked bedding. Very rare fine gray silty pyritic streaks. Very rare very small brownish-gray silty crystalline lenses.
423.8	424.4	Oil shale: Medium and some dark grayish brown to some tan and buff, dolomitic. Faint to distinct laminae; common very fine loop structures. Rare very short tight tension cracks. Sample of distinctly laminated oil shale from 424.1 feet: X-ray - dolomite, quartz, calcite, feldspar, analcite.
424.4	426.2	Oil shale: Dark grayish brown, rare very fine satiny black streaks; dolomitic. Faint streaked bedding. Some medium to high angle fractures with very sparse very fine pyrite in upper part.
426.2	427.4	Oil shale: Medium to dark grayish brown, dolomitic. Faint streaked bedding. Very rare fine brown crystalline blebs.
427.4	428.6	Oil shale: Tan to medium and rare dark grayish brown, dolomitic. Moderately distinct to faint laminae. Mostly irregular fractured to vuggy and earthy brecciated core pieces with some drusy calcite and sparse very fine pyrite. Uneven sample split. Sample of brecciated oil shale with drusy calcite from 428.0 feet: X-ray - calcite, dolomite, Na feldspar, quartz.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
428.6	430.9	Oil shale: Medium to very dark grayish brown and rare black. Faint to moderately distinct laminae; common fine to small loop structures. Common very thin to fine brown dense to silty crystalline streaks at 429.2. Sample of dark oil shale with brown streaks from 429.2 feet: X-ray - quartz, Na feldspar, dolomite, calcite, analcite, aragonite.
430.9	432.9	Oil shale: Dark to some medium grayish brown, some very fine satiny black streaks; dolomitic. Faint to moderately distinct streaked bedding.
432.9	433.9	Oil shale: Dark to medium grayish brown and brown, dolomitic. Faint to moderately distinct laminae and streaked bedding; some fine loop structures and small displacements.
433.9	434.8	Oil shale: Medium brown to rare dark grayish brown, rare resinous black laminae; dolomitic. Moderately distinct to faint laminae; some fine to small loop structures. Rare fine dense brown laminae.
434.8	436.8	Oil shale: Medium to dark brown, dolomitic to slightly calcareous. Faintly laminated; common very fine loop structures. Some thin zones with very common fine dense dark brown blebs. Sample of oil shale with <u>very</u> common fine dense blebs from 435.3 feet: X-ray - quartz, dolomite, calcite, feldspar, aragonite.
436.8	437.8	Oil shale: Medium to dark brown, some tan in 1-inch zones; slightly calcareous. Faint to distinct laminae; some fine loop structures and displacements. Few thin zones with fine dense blebs as above. Rare very fine short calcite-filled fractures.
437.8	438.8	Oil shale: Medium to some dark brown and grayish brown, dolomitic. Faintly laminated; common fine to small loop structures.
438.8	439.9	Oil shale: Dark to some medium grayish brown and black, some satiny luster; dolomitic. Faintly laminated; common fine to small loop structures in upper part. A thin gray-buff silty to very fine blebby-textured tuff at 439.4. Sample of gray-buff tuff from 439.4 feet: X-ray - K and Na feldspars, dolomite, pyrite.
439.9	440.0	Missing?
440.0	441.5	Oil shale: Dark to medium grayish brown and brown, dolomitic to slightly calcareous. Faint to moderately distinct laminae; common fine loop structures and displacements in lower part. Rare fine gray silty pyritic blebs and streaks.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
441.5	442.8	<p>Oil shale: Medium to rare dark brown with common thin to 3-inch tan to buff zones; calcareous to some dolomitic. Faint laminae with some fine loop structures in brown zones; distinct laminae with common fine loop structures and displacements in light zones. Some very fine gray pyritic (?) streaks in brown zones. Some very fine high angle calcite-filled fractures in light zones.</p> <p>Sample of tan to buff oil shale from 442.0 feet: X-ray - dolomite, quartz, feldspar, calcite.</p> <p>Sample of brown oil shale from 442.6 feet: X-ray - dolomite, quartz, calcite, feldspar, ferroan.</p>
442.8	444.8	<p>Oil shale: Buff and tan to medium brown and rare dark grayish brown, calcareous. Distinctly laminated with rare fine loop structures and displacements. A very irregular fine to 1-inch, tan to brownish-gray silty stringer with common fine buff-white earthy specks in distorted zone at 443.9 to 444.1; stringer changes horizons by 1-1/2 inches in middle of core. Very tight mosaic breccia with very fine calcite-filled fractures at 444.1 to 444.5.</p> <p>Sample of tan to brownish-gray silty stringer with very fine white specks from 443.9 feet: X-ray - quartz, calcite, analcite, dolomite, feldspar.</p>
444.8	445.9	<p>Oil shale: Dark to medium grayish brown and brown, dolomitic. Faint laminae and streaked bedding; some slightly distorted and displaced. Rare small brown dense to silty crystalline lenses and streaks. Rare very fine discontinuous calcite-filled fractures. A very irregular 1- x 2-inch porous to spongy mass with very abundant drusy crystals at 445.2.</p> <p>Sample of porous to spongy oil shale with drusy calcite from 445.2 feet: X-ray - calcite, dolomite, quartz, feldspar, analcite.</p>
445.9	446.9	<p>Oil shale: Light to medium brownish gray, dolomitic. Very faintly laminated. Regular thick to thin parting. Common very fine gray pyritic streaks. A high angle fracture with some patchy calcite crusts, dark brown to black organic specks, and sparse very fine pyrite extends through interval.</p> <p>Sample of oil shale with very fine gray streaks from 446.5 feet: X-ray - quartz, dolomite, Na feldspar, pyrite, analcite, mixed layer clay.</p>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
446.9	447.9	Oil shale: Medium to some dark grayish brown, dolomitic. Faint to moderately distinct laminae. Rare very fine gray pyritic streaks. High angle fracture with calcite, pyrite and some organic material continues through interval. A very regular thin grayish-tan silty and slightly earthy tuff lamina at base. Sample of grayish-tan tuff from 447.9 feet: X-ray - K and Na feldspars.
447.9	448.9	Oil shale: Dark grayish-brown to black, satiny to resinous luster from 448.2 to 448.6; dolomitic. Faintly laminated; rare fine loop structures. Very regular shaly to papery parting in very rich part. Some thin brownish-gray silty lenses at 448.1. A thin zone of fine buff earthy tuff laminae and streaks at 448.2. Common fine dense to silty and blebby dark brown laminae and streaks in lower part.
448.9	449.8	Oil shale: Very dark to medium grayish brown and rare black, dolomitic. Fairly distinct laminae; rare fine to small loop structures. Very rare fine brownish-gray silty lenses. Very rare very fine gray pyritic streaks and lenses.
449.8	450.8	Oil shale: Dark to medium grayish brown and some tan to rare buff, dolomitic. Moderately to very distinct laminae. Rare very fine dark gray pyritic streaks and laminae. Some small to 3/4-inch, buff to brownish-gray silty tuff nodules near top.
450.8	452.0	Oil shale: Medium to some dark grayish brown, dolomitic. Moderately distinct to faint laminae. Common very fine gray pyritic streaks and laminae in upper part. A very thin buff silty to earthy tuff lamina at 451.8.
452.0	452.7	Oil shale: Very dark grayish brown to black, nearly all has satiny to resinous luster; dolomitic to slightly calcareous. Faintly laminated; rare fine loop structures and displacements. Common very fine dark grayish-brown dense blebby laminae and streaks in upper half. A fine buff earthy tuff lamina at 452.1. Sample of very dark satiny oil shale from 452.2 feet: X-ray - dolomite, quartz, feldspar.
452.7	454.3	Oil shale: Dark grayish brown, rare black in upper part; dolomitic to slightly calcareous. Faintly laminated. A fine gray-buff silty tuff streak at 453.7 and a fine pinch-and-swell buff silty to earthy stringer at 454.2. A fine brittle black organic streak at 553.8.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
454.3	455.1	Oil shale: Medium to some dark grayish brown, slightly calcareous. Faintly laminated. Few short tight high angle fractures. Sample of oil shale from 454.4 feet: X-ray - dolomite, quartz, feldspar, calcite.
455.1	456.0	Oil shale: Grayish brown to tan and buff, calcareous. Moderately distinct to faint laminae; distorted in middle part. Common short tight to open fractures and some fine to rare small irregular partly collapsed cavities. Light-colored parts are slightly earthy. Some broken core in middle.
456.0	456.9	Oil shale: Medium and rare dark grayish brown to some tan and buff, calcareous. Moderately distinct to faint laminae. Common very short open fractures and some fine to large irregular partly collapsed cavities in upper half; some tight high angle fractures with very fine pyrite in lower part.
456.9	457.8	Oil shale: Very dark to medium grayish brown and rare black, slightly calcareous to dolomitic. Faint to fairly distinct laminae; common fine loop structures and displacements in lower part. Some dense brown to dark brownish-gray dolomite laminae in lower part.
457.8	458.0	Tuff: Tan to buff, massive, slightly earthy. Very regular band. A fine dark oil-shale layer at base. Sample of tuff from 457.9 feet: X-ray - K and Na feldspars.
458.0	458.1	Tuff: Light brownish gray, massive, silty and slightly earthy. Irregular stringer.
458.1	458.6	Oil shale: Black to dark grayish brown, common satiny to resinous luster; dolomitic to slightly calcareous. Faintly laminated; some fine loop structures and displacements. Some very thin to fine black to light brownish-gray silty lenses near top.
458.6	459.3	Oil shale: Very dark to some medium grayish brown, dolomitic. Faintly laminated; common fine loop structures.
459.3	460.3	Oil shale: Medium to dark grayish brown and rare black, dolomitic to slightly calcareous. Faint to moderately distinct laminae. Some thin buff earthy tuff stringers and brownish-gray lenses in lower part and a very irregular 0.1-foot stringer near base.
460.3	461.0	Oil shale: Dark to some medium grayish brown, dolomitic to slightly calcareous. Faintly laminated; common fine to small loop structures.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
461.0	461.8	Oil shale: Dark to medium grayish brown, dolomitic. Faintly laminated; common fine to small loop structures. Some <u>very</u> fine white calcite streaks at 461.4. A very fine diagonal calcite-filled fracture in lower half. Irregular vuggy surface at base.
461.8	462.7	Oil-shale breccia: Dark to medium grayish brown. Fine to very coarse, fairly tight to open breccia. Abundant white calcite in fractures in upper part. Abundant very fine scattered pyrite. Uneven sample split.
462.7	463.8	Oil shale: Dark to medium brownish gray, calcareous to dolomitic. Moderately distinct to faint laminae; some fine loop structures. A high angle fracture with calcite in upper part. Some very thin gray pyritic lenses at 462.9. A 3/4-inch stringer of buff slightly earthy tuff at 463.3.
463.8	464.8	Oil shale: Medium to dark brownish gray, calcareous. Faint laminae to some distorted streaks and stringers. Some short tight irregular fractures. Sample of dark brownish-gray oil shale from 464.3 feet: X-ray - calcite, dolomite, quartz, feldspar.
464.8	467.0	Oil shale: Medium to some dark grayish brown and rare tan to buff; calcareous. Faint to some moderately distinct laminae. Abundant fine to small white to buff crystalline calcite blebs and streaks. Some short tight high angle fractures in upper part. Sample of oil shale with very abundant fine calcite blebs from 466.6 feet: X-ray - calcite, dolomite, quartz, feldspar.
467.0	469.0	Oil shale: Light to medium and some very dark brownish gray, calcareous to dolomitic. Faint to fairly distinct laminae. Common thin white blebby calcite stringers and some fine elongate pseudomorphs.
469.0	471.0	Oil shale: Medium to light brownish gray and some buff, dolomitic. Moderately distinct laminae; common fine loop structures and displacements. Common thin white pyritic calcite stringers and streaks.
471.0	472.8	Oil shale: Medium to light brownish gray, dolomitic. Faint laminae to very faint streaked bedding. Common thin porous granular calcite streaks and small patches. Sample of oil shale with calcite streaks from 472.3 feet: X-ray - calcite, dolomite, feldspar, analcite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
472.8	473.2	Missing?
473.2	475.0	Oil shale: Medium to light brownish gray, dolomitic. Faint laminae and some streaked bedding. Common calcite streaks, blebs, and patches. A 0.1-foot gray-buff to light and some medium gray tuff (?) band at 473.6. Sample of gray-buff to light gray tuff from 473.6 feet: X-ray - calcite, Na and K feldspars.
BASE OF MAHOGANY ZONE		
TOP OF B-GROOVE		
475.0	476.0	Marlstone and very lean oil shale: Light to some medium brownish gray and rare buff, dolomitic. Faint laminae to very faint streaked bedding. Some very thin to fine pyritic calcite streaks. Rare fine fractures with pink calcite fillings.
476.0	479.6	Marlstone: Buff and some tan to light and rare medium brownish gray, dolomitic to calcareous. Faint smooth to some distorted and displaced laminae and streaked bedding. Common fine calcite streaks with pyrite. Some fine to small irregular partly collapsed cavities.
479.6	479.9	Missing?
479.9	481.0	Oil shale: Medium to light brownish gray and olive gray, dolomitic. Very faint smooth laminae and streaked bedding. Regular thin shaly parting in upper part. Common very fine pyrite and calcite streaks. Some calcite-encrusted fractures. Sample of oil shale with very fine pyrite and calcite streaks from 480.7 feet: X-ray - dolomite, feldspar, pyrite.
481.0	482.6	Marlstone: Buff to light and some medium brownish gray, dolomitic. Faint to some moderately distinct laminae. Common fine pyrite streaks. Some calcite-encrusted fractures. Some broken and mixed up core.
BOTTOM OF B-GROOVE		
482.6	485.2	Missing.
485.2	486.9	Oil shale: Medium to light brownish gray and grayish brown, dolomitic. Faint to moderately distinct laminae; sharply angular

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		double z-shaped folds with flat conformable laminae above and below at 485.6 to 485.9. Common fine white crystalline calcite streaks and blebs with abundant very fine pyrite.
486.9	487.9	Marlstone and very lean oil shale: Buff to light and some medium brownish gray, calcareous. Tight indistinct mosaic breccia in upper part; faintly laminated in lower part. Fairly common calcite blebs. Some very short tight to open fractures and very small irregular cavities in lower part. Sample of marlstone breccia from 487.1 feet: X-ray - dolomite, calcite, quartz, feldspar, analcite, pyrite.
487.9	490.0	Oil shale: Medium grayish brown with some thin to 0.2-foot very dark satiny zones; dolomitic. Very dark oil shale with very distorted faint streaked bedding in upper 0.2 foot; discontinuous streaks with faint to distinct internal laminae in other parts; a 3-inch regularly laminated zone in lower part. Some irregular vuggy core pieces with fairly coarse irregular boxworks at 488.2. Some fine cavities and crystalline calcite blebs. Fairly common thin irregular tan lenses with common dark specks and some pyrite at 488.5-488.8. Rare fine pyrite streaks and blebs in lower part. Sample of thin tan lens from 488.6 feet: X-ray - dolomite, feldspar, quartz.
490.0	492.0	Oil shale: Medium and some dark grayish brown to some tan and rare buff; dolomitic to slightly calcareous. Distinct very smooth laminae. Very regular thick parting. Very common very fine dark gray flecks and streaks in upper part becoming rare in lower part. Sample of oil shale with very common dark gray flecks from 490.5 feet: X-ray - dolomite, feldspar, calcite, pyrite, ferroan.
492.0	492.9	Oil shale: Very dark to some medium brownish gray, common satiny to some resinous luster; dolomitic. Faint to moderately distinct laminae; some fine to small loop structures and displacements. Some irregular natural (?) fractures. A very irregular 0.2-foot tan to brownish-gray silty tuff stringer in middle. Sample of tan to grayish-brown silty tuff from 492.5 feet: X-ray - Na and K feldspars, calcite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
492.9	493.6	Oil shale: Very dark to medium grayish brown and brown, some satiny to resinous luster; dolomitic. Distinctly laminated; some fine to small loop structures and displacements. Very distorted and displaced finely fractured oil shale with calcite fillings in upper 0.3 foot.
493.6	494.3	Oil shale: Dark to medium grayish brown, dolomitic to slightly calcareous. Moderately distinct very smooth laminae. Some very fine dark gray flecks and streaks (like 490.5 feet).
494.3	495.4	Oil shale: Grayish brown to tan and buff, slightly calcareous. Distinctly laminated. Some very fine dark gray streaks in upper part. Some fat insect larvae in upper part. A 3-inch very regular faintly bedded brown to tan silty tuff band at top; a 1- to 1-1/2-inch buff stringer at 494.9. A tight high angle fracture with brown varnish-like coatings and some crystalline calcite in lower 0.4 foot. Sample of brown tuff from 494.4 feet: X-ray - Na and K feldspars.
495.4	496.5	Oil shale: Medium and rare dark grayish brown and brownish gray to some tan and buff; calcareous. Distinctly laminated. Rare light gray silty laminae. A 0.2-foot massive slightly earthy buff tuff band at base.
496.5	497.6	Oil shale: Dark to medium grayish brown and some tan; slightly calcareous to dolomitic. Distinct to faint laminae. Rare fine to thin, tan to buff tuff streaks and lenses. Common very fine dark gray streaks and flecks in lower part.
497.6	498.5	Oil shale: Buff and tan to medium and rare dark grayish brown, calcareous. Very distinctly laminated; some fine displacements in lower part. Common very short tight and rare open high angle fractures. Common <u>very</u> fine disseminated crystals in lower part (pyrite in part). Sample of oil shale with very common very fine disseminated crystals from 498.2 feet: X-ray - dolomite, calcite, quartz, feldspar, pyrite.
498.5	499.8	Marlstone: Buff to some tan and rare grayish brown. Earthy buff marlstone with some broken oil-shale layers in upper 0.4 foot; rubble in other parts--mostly faintly bedded with some distinctly laminated pieces. Grab sampled.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of earthy buff marlstone from 498.7 feet: X-ray - dolomite, quartz, feldspar, pyrite.
499.8	501.8	Oil shale: Medium and some dark grayish brown to some tan and buff, calcareous to dolomitic. Very faint to distinct laminae. Common very fine disseminated crystals in upper part. Common very fine dark gray specks and streaks in lower part. Two thin buff tuff (?) streaks with small to fine dark gray pyritic blebs at 500.6 to 500.7.
501.8	503.0	Oil shale: Buff and tan to medium and rare dark grayish brown, slightly calcareous to dolomitic. Very distinct laminae. Very regular thick parting. A very regular thin tan silty tuff lamina at 501.9.
503.0	503.6	Oil shale: Medium to dark brown and grayish brown, rare tan to buff; dolomitic. Distinctly laminated. A fine light gray slightly silty lamina at 503.1 and a fine dark gray lamina at 503.5.
503.6	504.3	Oil shale: Medium to very dark grayish brown, dolomitic. Faintly laminated. Rare fine dark gray silty laminae. Some thin to fine, tan to buff silty tuff streaks in lower 0.2 foot. Some very fine disseminated pyrite near base.
504.3	504.5	Tuff: Brownish gray, silty. Faintly streaked and mottled. Sample of tuff from 504.3 to 504.5 feet: X-ray - Na and K feldspars, dolomite, pyrite.
504.5	505.0	Oil shale: Medium to dark grayish brown and rare tan, dolomitic. Moderately distinct laminae. Common very fine dark gray specks and streaks.
505.0	505.6	Oil shale: Buff and tan to medium and some dark grayish brown, dolomitic. Distinctly laminated. Some fine gray pyritic streaks. Rare short tight high angle fractures.
505.6	506.3	Oil shale: Medium to very dark grayish brown, dolomitic. Faint to moderately distinct laminae and some streaked bedding. Rare dark gray pyritic streaks. Sample of dark grayish-brown oil shale from 505.8 feet: X-ray - dolomite, feldspar, quartz, pyrite, illite?
506.3	507.2	Oil shale: Medium brown to dark grayish brown, dolomitic. Fairly distinct to faint laminae. A thin brown silty tuff lamina at 506.8 and a fine lamina at 506.9.
507.2	508.2	Oil shale: Medium to dark grayish brown, dolomitic. Moderately distinct laminae. Rare fine gray pyritic streaks and laminae.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
508.2	508.9	Oil shale: Medium to some dark grayish brown, medium brown to tan at 508.6-508.8; dolomitic to slightly calcareous. Faintly laminated to some very faint streaked bedding. Small to 1-inch, brown to tan, silty to very fine sandy-textured tuff lenses at 508.4.
508.9	509.0	Missing?
509.0	510.0	Oil shale: Buff to dark brownish gray in upper 0.4 foot, medium to dark brownish gray and some tan in lower part: slightly calcareous to dolomitic. Distinctly laminated in upper part; faint streaked bedding and some moderately distinct laminae in lower part. Very rare very fine resinous black streaks in lower part. Sample of distinctly laminated buff to dark brownish-gray oil shale from 509.3 feet: X-ray - dolomite, calcite, quartz, feldspar, pyrite, ferroan.
510.0	511.0	Oil shale: Medium to dark brown and grayish brown, dolomitic to slightly calcareous. Moderately distinct laminae. A very fine black silty lamina at 510.2 and a very fine gray-buff to gray dense lamina 3/4 inch lower.
511.0	511.9	Oil shale: Medium to some light and dark grayish brown and brownish gray, dolomitic. Fairly distinct laminae. A very thin light brownish-gray tuff lamina at 511.8.
511.9	512.2	Missing?
512.2	513.1	Oil shale: Medium to some light and dark brownish gray, dolomitic. Fairly distinct to very faint laminae. Rare very fine black silty laminae and streaks in lower part.
513.1	513.6	Tuff: Medium brownish gray to almost neutral gray, silty textured. Faintly streaked to massive. Slightly wavy conformable contacts at top and bottom; a thin medium to light brownish-gray oil-shale stringer near top. Sample of gray silty tuff from 513.4 feet: X-ray - Na feldspar, pyrite.
513.6	514.2	Oil shale: Medium to very dark brownish gray and grayish brownish, rare resinous to waxy black laminae; dolomitic. Faint to fairly distinct laminae; common small to fine loop structures and displacements. Some fine orange-brown streaks and lenses at 514.1.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of dark oil shale with orange-brown streaks from 514.1 feet: X-ray - dolomite, quartz, feldspar, calcite, pyrite.
514.2	516.0	Oil shale: Medium and rare dark grayish brown to buff, dolomitic. Distinctly laminated. A 1-inch zone with <u>very</u> fine crystalline texture at 515.5. A fine brownish-gray silty tuff lamina at 515.6.
		Sample of finely laminated oil shale with very fine crystalline texture (or very abundant disseminated crystals) from 515.5 feet: X-ray - dolomite, calcite, feldspar, quartz.
516.0	517.0	Oil shale: Medium and some dark grayish brown to tan and some buff, very slightly calcareous to dolomitic. Distinctly laminated. Very rare very fine gray silty crystalline laminae. Some fine buff tuff (?) streaks near base.
517.0	518.0	Oil shale: Medium to very dark grayish brown and rare tan, some satiny to resinous luster; dolomitic to slightly calcareous. Fairly distinct streaked bedding in upper 1-1/2 inches; distinct to faint laminae with common fine to small loop structures in other parts. Rare fine buff to brown tuff (?) streaks in lower half.
		Sample of medium to very dark grayish-brown oil shale from 517.7 feet: X-ray - calcite, dolomite, aragonite, feldspar, quartz, pyrite.
518.0	518.5	Tuff: Tan to buff, silty textured. Common thin to fine contorted oil-shale stringers as above and below. Wavy conformable contacts at top and bottom.
		Sample of tuff with some fine oil-shale stringers from 518.3 feet: X-ray - Na feldspar, quartz, calcite.
518.5	519.2	Oil shale: Black to dark and some medium grayish brown, common satiny to resinous luster in upper half; slightly calcareous. Faint to moderately distinct laminae; common fine to small loop structures and displacements. Some fine to small buff to brown tuff lenses and streaks. Abrupt change to leaner shale at base.
519.2	520.1	Oil shale: Medium to some dark grayish brown and brownish gray, some tan and light brownish gray; dolomitic. Moderately distinct to faint laminae. Rare fine brownish-gray silty streaks and small lenses.
520.1	521.0	Oil shale: Medium to some light and dark brownish gray, dolomitic. Dark oil shale with moderately distinct streaked bedding in upper

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		1-1/2 inches; faint to moderately distinct very fine laminae in other parts. Very regular shaly to papery parting in lower 0.1 foot.
521.0	522.3	Oil shale: Medium to very dark brownish gray, rare satiny luster; dolomitic. Moderately distinct to faint laminae; common fine loop structures. Some <u>very</u> fine disseminated crystals in middle part. A small brownish-gray silty lens at 521.9.
522.3	522.7	Oil shale: Medium brownish gray, a thin very dark satiny zone at 522.6; dolomitic. Faintly laminated; some fine to small loop structures and displacements. A 3/4-inch buff to brownish-gray very fine sandy to silty-textured tuff stringer at top; a very fine tuff stringer at base.
522.7	524.8	Oil shale: Buff and tan to medium brownish gray, dolomitic. Fairly distinct to faint laminae; rare very fine loop structures and displacements. Sample of faintly laminated brownish-gray oil shale from 524.7 feet: X-ray - dolomite, Na and K feldspars, quartz, pyrite.
524.8	526.9	Marlstone: Buff and tan to rare medium grayish brown, slightly calcareous to calcareous. Faint to some moderately distinct laminae; some thin irregular cross-laminated zones. Rare short tight high angle fractures with fine pyrite patches. A 1/2- x 1-1/2-inch white porous silty to blebby and slightly earthy lens at 525.5. Sample of white lens from 525.5 feet: X-ray - mixed layer clay, Na feldspar, kaolin. Sample of buff to tan marlstone from 525.9 feet: X-ray - dolomite, quartz, feldspar.
526.9	527.4	Oil shale: Dark grayish brown, common fine black satiny streaks, dolomitic. Moderately distinct streaked bedding. Very abundant fine dark to medium grayish-brown, silty to dense blebs and streaks. Sample of very dark oil shale with fine dense to silty blebs and streaks from 527.0 feet: X-ray - dolomite, quartz, feldspar, ferroan, pyrite, illite.
527.4	528.2	Oil shale: Medium grayish brown and some tan, dolomitic. Faint streaked bedding and some laminae. Vuggy parting surfaces with coarse boxworks at 528.0.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
528.2	529.1	Oil shale: Like 526.9 to 527.4 feet. Some 1/2- to 3/4-inch zones of very faintly laminated medium brownish-gray oil shale in lower half. A thin zone with contorted and truncated laminae at 528.6.
529.1	530.6	Oil shale: Medium to dark grayish brown, dolomitic. Faintly laminated. A 1/2-inch porous silty tuff stringer at 529.2; sharply divided into buff part in upper half and light to medium gray in lower half. A 1/2-inch brownish-gray tuff band at 529.3 and a fine lamina at 529.4. Rare fine dark gray silty pyritic laminae.
530.6	531.6	Oil shale: Dark grayish brown, dolomitic. Very faintly laminated; some fine loop structures.
531.6	532.9	Oil shale: Medium and some dark brownish gray, dolomitic. Faintly laminated. Rare fine gray pyritic streaks and blebs. Some very regular thin shaly parting in upper part.
532.9	533.6	Oil shale: Grayish brown to tan, dolomitic. Faintly laminated. Some very fine gray pyritic streaks in lower part.
533.6	534.6	Oil shale: Medium to dark grayish brown, common very fine satiny to resinous black streaks in dark zones; dolomitic. Faint to moderately distinct laminae in lighter zones; moderately distinct streaked bedding in darker zones. Some small dark brownish-gray silty lenses at 534.4.
534.6	535.3	Oil shale: Medium to very dark grayish brown, dolomitic to calcareous. Faintly laminated; rare fine loop structures. Some small grayish-brown silty lenses at 534.8. Common <u>very</u> fine disseminated crystals in lower part. A tight vertical fracture with calcite crusts in lower half. Sample of small grayish-brown silty lenses from 534.8 feet: X-ray - Na feldspar, calcite, dolomite, quartz, pyrite.
535.3	536.3	Oil shale: Very dark brownish gray to black, most has satiny to resinous luster; dolomitic. Faint laminae and streaked bedding. Rare fine medium to dark brownish-gray silty laminae, streaks, and blebs. Very regular thick to rare thin parting. Sample of black satiny to resinous oil shale from 536.2 feet: X-ray - quartz, feldspar, calcite, dolomite, analcite, ferroan, pyrite.
536.3	537.4	Oil shale: Very dark brownish gray and some black, common satiny and some resinous luster; dolomitic. Faint laminae and streaked

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		bedding. Some very fine dark brownish-gray silty streaks and blebs in upper part. Rare fish fragments. Very regular thick to thin parting.
537.4	538.0	Oil shale: Very dark to some medium grayish brown, rare satiny to resinous luster; dolomitic. Faintly laminated. Rare fine dark brownish-gray silty blebs. Some fine dense grayish-brown dolomite streaks at 537.8.
538.0	539.0	Oil shale: Medium grayish brown to tan and rare buff, dolomitic. Faintly laminated; rare fine loop structures. Rare very fine dark gray silty streaks.
539.0	540.0	Oil shale: Medium grayish brown and brownish gray, dolomitic. Very faint laminae and streaked bedding. Some very fine gray silty streaks in upper part. A diagonal fracture with very slight varnish-like coatings at 539.2.
540.0	541.6	Oil shale: Medium grayish brown and brownish gray to buff, dolomitic. Faint to moderately distinct laminae. Some short fairly tight high angle fractures with pyrite. Common small to fine irregular cavities at 540.2; a 1-inch vug with fine boxworks and some fine to coarse pyrite at 541.3. Some buff-white earthy to silty and blebby slightly calcareous streaks and stringers in lower part. Regular to irregular, thick to thin parting.
541.6	542.6	Oil shale: Dark to medium grayish brown, common fine to thin satiny black streaks; dolomitic. Fairly distinct streaked bedding in upper part; distinct very irregular stringers with faint contorted and truncated internal laminae in lower part. Fairly common fine to small vugs with radial boxworks; a 1-1/2- x 2-inch vug with boxworks at base.
		Sample of oil shale with fine vugs from 541.7 feet: X-ray - dolomite, Na feldspar, quartz, analcite, pyrite, ferroan.
542.6	543.6	Oil shale: Medium to some light and dark grayish brown, some satiny to resinous black streaks near top; dolomitic. Moderately distinct to faint laminae; some fine loop structures and displacements. Regular thick to medium parting in lower part. An irregular vuggy core piece with boxworks and pyrite at 543.2; some wavy bedding-plane fractures with abundant coarse pyrite.
543.6	544.8	Oil shale: Medium to dark and some light grayish brown and brownish gray, dark zone with common very fine satiny black streaks in upper 0.2 foot; dolomitic. Faint to fairly distinct laminae. Some very

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
544.8	549.0	<p>fine gray to black pyritic streaks. A diagonal fracture with some pyrite from 543.8 to 544.3.</p> <p>Marlstone: Yellowish buff to light brownish gray, some medium brownish gray near top; dolomitic. Moderately distinct to faint laminae; common fine loop structures and displacements. Common very fine medium to light gray silty laminae and streaks. Some irregular high angle fractures with varnish-like coatings in upper foot; rare diagonal fractures elsewhere.</p> <p>Sample of marlstone with very fine gray silty laminae from 547.8 feet: X-ray - dolomite, analcite, feldspar, quartz, ferroan.</p>
549.0	550.0	<p>Oil shale: Buff and tan to medium brownish gray, dolomitic. Faint to fairly distinct laminae; common very fine loop structures. Some very fine gray silty laminae and streaks.</p>
550.0	551.6	<p>Marlstone: Buff to tan and rare medium brown, dolomitic. Moderately distinct to very faint laminae and some very faintly bedded bands; common very fine loop structures. Rare very thin to fine gray silty pyritic streaks.</p> <p>Sample of very faintly bedded buff marlstone from 550.9 feet: X-ray - dolomite, Na and K feldspars, quartz, ferroan.</p>
551.6	552.3	<p>Oil shale: Light to medium brownish gray, dolomitic. Moderately distinct to very faint laminae; common very fine loop structures. A nearly vertical fracture with fine scattered pyrite and fine brownish-black crusty specks extends through interval. Very abrupt change to richer shale at base.</p>
552.3	554.8	<p>Oil shale: Very dark to medium grayish brown, rare black satiny streaks and laminae; dolomitic. Moderately distinct streaked bedding in irregular darker and lighter zones in upper part; moderately distinct to faint laminae with some fine loop structures below 554.2.</p>
554.8	555.8	<p>Oil shale: Medium to dark grayish brown, some tan in lower part; dolomitic. Faint to very distinct laminae; common fine loop structures. Some fine black pyritic streaks.</p>
555.8	556.8	<p>Oil shale: Brown and grayish brown to tan and buff, dolomitic. Very faint to very distinct laminae. A vertical fracture with slight varnish-like coatings extends through very faintly laminated zone at 555.9-556.3.</p>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of very faintly laminated brown to tan oil shale from 556.1 feet: X-ray - dolomite, quartz, feldspar, analcite, ferroan.
556.8	558.0	Oil shale: Dark grayish brown, dolomitic. Faint streaked bedding.
558.0	558.5	Oil shale: Very dark grayish brown to black, common satiny to resinous luster; dolomitic. Faint streaked bedding. Very regular medium to thin parting. Some distinct tan laminae near base. A small dark brownish-gray silty nodule at base.
558.5	559.5	Oil shale: Very dark to rare medium grayish brown, some black in upper part; dolomitic. Faint to moderately distinct laminae and streaked bedding; some very fine distinct tan to buff laminae in upper part. A 0.1-foot band of medium to light brownish-gray, silty to very fine sandy-textured tuff near top.
		Sample of tuff from 558.6 feet: X-ray - analcite, Na and K feldspars, quartz, ferroan.
559.5	560.4	Oil shale: Dark to medium grayish brown, some thin to fine satiny black stringers and streaks; dolomitic. Fairly distinct to faint distorted and displaced laminae, streaks, and stringers.
560.4	561.3	Oil shale: Medium brown to tan and buff, dolomitic to slightly calcareous. Faint to very distinct laminae; common fine loop structures. Some irregular core pieces. Some short tight fractures.
561.3	562.1	Oil shale: Buff to medium grayish brown, dolomitic. Tight breccia composed of very coarse to fine laminated fragments in upper half; faint contorted and displaced stringers in lower part. Earthy calcareous material in breccia. Some fine black pyritic blebs and streaks.
562.1	563.5	Oil shale: Very dark to some medium grayish brown and brownish gray, dolomitic. Faint streaked bedding. Some irregular discontinuous open fractures with pyrite. Rare small tight to porous breccia masses.
563.5	563.8	Oil shale: Medium grayish brown to rare tan and buff, dolomitic. Faintly laminated; some fine to 1/2-inch low angle displacements.
563.8	566.2	Oil shale: Very dark grayish brown, dolomitic. Faint streaked bedding; commonly curved to wavy and some steeply inclined. Irregular wavy to "curly" parting. Some hackly open fractures with sparse pyrite. Some very irregular core pieces.
		Sample of very dark oil shale from 564.0 feet: X-ray - dolomite, Na and K feldspars, quartz, illite, ferroan.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
566.2	567.4	Oil shale: Dark to medium grayish brown, dolomitic. Moderately distinct laminae with common fine to small loop structures; laminae inclined about 45° in upper part to about 20° in lower part.
567.4	569.4	Oil shale: Medium grayish brown to some dark in lower part, dolomitic. Faintly laminated; common fine to small loop structures. Some very fine disseminated crystals. Rare thin massive dolomite laminae.
569.4	570.5	Oil shale: Dark to some medium brownish gray, dolomitic. Faint very fine laminae and streaked bedding. Common very fine pyrite streaks and blebs. Some fine brownish-gray to brown silty tuff laminae and streaks in upper part.
570.5	571.7	Oil shale: Medium and some dark brownish gray, dolomitic. Faintly laminated. Some very fine pyrite streaks. Sample of oil shale with some very fine pyrite streaks from 571.3 feet: X-ray - Na and K feldspars, dolomite, pyrite, illite, ferroan.
571.7	573.4	Marlstone: Buff and tan to rare medium and dark grayish brown, slightly calcareous. Faint to rare distinct laminae. Regular thick to thin parting. Some gray silty laminae and streaks.
573.4	573.7	Missing?
573.7	575.0	Oil shale: Medium and rare dark brownish gray, dolomitic. Faint very fine laminae and streaked bedding. Some very fine gray silty pyritic streaks. Regular thick to rare thin parting.
575.0	576.1	Oil shale: Medium to dark and some light brownish gray, some black satiny laminae near base; dolomitic. Faint to moderately distinct laminae; some fine loop structures in lower part. Common very fine gray to black crystals and silty streaks in upper part. Some tight irregular high angle fractures with sparse very fine pyrite. Sample of light brownish-gray oil shale with very abundant very fine dark crystals from 575.3 feet: X-ray - Na and K feldspars, dolomite, ferroan, analcite.
576.1	579.0	Marlstone: Buff, slightly earthy and silty, calcareous. Very faintly bedded. Mostly irregular core pieces to jumbled rubble. Length uncertain; grab sampled. Sample of marlstone from 578? feet: X-ray - dolomite, Na and K feldspars, quartz.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
579.0	587.0	Missing.
587.0	588.7	Oil shale: Dark brownish gray, dolomitic. Faint streaked bedding. Common <u>very</u> fine disseminated crystals in upper part. Some irregular open fractures and porous crushed zones in lower part. Sample of oil shale with very fine disseminated crystals from 587.1 feet: X-ray - dolomite, Na and K feldspars, ferroan, illite, quartz.
588.7	590.4	Oil shale: Dark to medium brownish gray, dolomitic. Faint streaked bedding and very fine laminae. Common <u>very</u> fine disseminated crystals in some parts. Rare very fine pyrite streaks. A very thin pinch-and-swell blebby tan to buff stringer near top.
590.4	593.2	Oil shale: Dark to medium brownish gray and grayish brown to tan, dolomitic. Faint laminae in distinct thin to thick lighter and darker zones; some fine loop structures. Some discontinuous tight high angle fractures.
593.2	594.6	Oil shale: Dark and some medium brownish gray, dolomitic. Faint laminae and very faint streaked bedding. Fairly dense and hard. Some irregular high angle fractures with slight brown coatings. Rare very fine pyritic streaks. Rare plant fragments.
594.6	597.2	Oil shale: Dark to medium brownish gray and grayish brown, some tan; dolomitic. Faint to moderately distinct laminae; common fine loop structures and displacements. Fairly common very fine dark gray to black pyritic specks and streaks. A thin tan to brown stringer with common fine dark gray specks and rare small nodules at 596.4. Sample of tan to brown stringer with dark gray specks from 596.4 feet: X-ray - Na and K feldspars, dolomite, analcite, ferroan.
597.2	598.4	Oil shale: Medium and rare dark brownish gray, dolomitic. Very faint laminae and streaked bedding. Some <u>very</u> fine disseminated crystals.
598.4	600.0	Oil shale: Dark to medium grayish brown, dolomitic. Faint streaked bedding to moderately distinct laminae; contorted near base. Common irregular discontinuous tight to slightly open fractures. A very irregular thick zone of coarse partly open breccia at 599.7. Uneven sample split.
600.0	601.0	Oil shale: Dark to medium brownish gray, dolomitic. Faint streaked bedding. Some very fine disseminated crystals. Some very fine silty pyritic blebs and streaks.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
601.0	603.0	Oil shale: Medium to some dark grayish brown and brownish gray, dolomitic. Faint laminae to very faint streaked bedding. Very common <u>very</u> fine dark gray pyritic (?) specks and streaks. Some tight irregular discontinuous fractures in upper part. Sample of oil shale with very fine dark gray specks and streaks from 602.3 feet: X-ray - Na and K feldspars, dolomite, analcite, ferroan, pyrite.
603.0	605.0	Oil shale: Medium to dark grayish brown, some black satiny to resinous laminae in lower part; dolomitic. Faint to moderately distinct laminae; common fine to small loop structures. Some very fine dark gray specks in upper part. A thin tan to buff silty tuff stringer at 603.8. Some very fine buff to white blebs with pyritic rims in lower part. Irregular fractured core pieces at base.
605.0	606.6	Oil shale: Medium to some dark grayish brown, some very dark satiny shale in lower two inches; dolomitic. Faint streaked bedding and some laminae. Common very fine dark gray specks and streaks. Some irregular thin parting in upper part.
606.6	607.2	Marlstone: Light brownish gray, slightly calcareous. Very faintly bedded. Irregular broken core pieces; length uncertain.
607.2	608.1	Missing?
608.1	612.0	Oil shale: Medium and rare dark brownish gray, dolomitic. Faint streaked bedding and rare very faint laminae. Common fine buff-white calcite blebs and irregular porous blebby streaks and patches with pyrite. Rare fine to small irregular cavities. Common very fine black submetallic flecks in some parts. Sample of oil shale with fine calcite blebs from 609.0 feet: X-ray - dolomite, feldspar, quartz, calcite, pyrite, illite.
612.0	613.0	Oil shale: Medium to light olive gray and some brownish gray, dolomitic to slightly calcareous. Very faint streaked bedding. Some fine calcite specks and streaks in upper part. Irregular thin to fine shaly parting in middle part. Some porous fractured zones with abundant very fine pyrite in lower part. Uneven sample split.
613.0	614.0	Oil shale: Medium to some dark brownish gray, dolomitic. Very faint streaked bedding in upper part to faint laminae in lower part. Irregular to very regular, very thin to thick parting. Some very fine buff earthy blebs in upper part. A thin zone with some very fine dark equant crystals and rare submetallic flecks at 613.7.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of dark brownish-gray oil shale with very fine crystals from 613.7 feet: X-ray - Na and K feldspars, dolomite, ferroan, quartz, illite.
614.0	615.0	Oil shale: Medium to rare dark grayish brown and brown, dolomitic. Faint laminae and streaked bedding. Regular to irregular, thick to very thin parting. Common fine buff earthy streaks. Some fine to small irregular cavities and porous masses.
615.0	616.3	Oil shale: Medium to rare dark grayish brown and brownish gray, dolomitic. Faint streaked bedding and some very fine laminae. Common very fine dark gray specks and streaks. Some very fine buff-white earthy specks at 615.8. Common very fine cavities with pyrite at 615.9-616.0.
616.3	617.3	Oil shale: Medium to dark brownish gray, dolomitic. Faint streaked bedding. Some fine buff pyritic calcite blebs, streaks, and discontinuous high angle fracture fillings. Some <u>very</u> fine disseminated crystals.
617.3	618.3	Oil shale: Medium to light brownish gray, dolomitic. Faint streaked bedding and very fine laminae. Some very fine and rare very thin dark gray pyritic streaks. Some irregular fractures with calcite and pyrite near top; some low angle fractures with sparse very fine pyrite in lower part.
618.3	619.7	Oil shale: Dark brownish gray to grayish brown, dolomitic. Faint streaked bedding and very fine laminae. Irregular to fairly regular, thick to thin parting. Very common <u>very</u> fine disseminated crystals. Common very fine dark gray pyritic streaks in upper part. Sample of oil shale with very fine disseminated crystals from 618.7 feet: X-ray - Na and K feldspars, illite, dolomite, ferroan, pyrite.
619.7	620.7	Oil shale: Dark to medium grayish brown, dolomitic. Faint very fine laminae. Fairly regular thick to some thin parting. Some <u>very</u> fine disseminated crystals and dark gray pyritic specks and streaks.
620.7	622.0	Oil shale: Medium to some light grayish brown and brownish gray, dolomitic to slightly calcareous. Faint laminae and streaked bedding. Regular to irregular, thick to thin parting. Common fine very pyritic calcite blebs and streaks; some small porous masses in lower part. Friable buff earthy calcareous pyritic mudstone in lower 0.1 foot; separated from oil shale above by very irregular surface with some fine cavities.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of buff earthy mudstone from 622.0 feet: X-ray - dolomite, quartz, feldspar, calcite, pyrite, illite.
622.0	623.0	Missing.
623.0	624.0	Oil shale: Light to medium brownish gray, dolomitic. Faint streaked bedding and very fine laminae. Common fine white calcite streaks with pyritic rims in upper part. Common very fine buff earthy porous pyritic blebs in lower part. Rubble in upper part with common fracture surfaces with very fine pyrite; one small fragment with fine tabular boxworks. Regular medium to very thin shaly parting in lower part. Length uncertain; partly grab sampled.
624.0	625.0	Oil shale: Medium to very dark brownish gray, dolomitic. Faint very fine laminae and streaked bedding. Regular to very irregular, very thin to thick parting. Some fine tan earthy porous pyritic blebs and streaks. Common very fine pyrite blebs in some parts. A very thin yellowish-buff silty to very fine sandy-textured tuff lamina near base.
625.0	626.0	Oil shale: Medium brownish gray, dolomitic. Faint very fine laminae and streaked bedding. Common very fine dark sub-metallic needles in upper part. Common small irregular porous granular calcite blebs and streaks with pyrite in lower 0.2 foot. Uneven sample split.
626.0	627.0	Oil shale: Medium brownish gray, dolomitic. Very faintly bedded to massive. Very common fine to small porous blebs and irregular stringers (fracture fillings?) of granular calcite with abundant pyrite. Irregular mixed up core pieces in lower part; length uncertain; partly grab sampled.
		Sample of calcite and pyrite from irregular porous blebs and stringers from 626.0 to 627.0 feet: X-ray - calcite, pyrite; some quartz, dolomite, feldspar.
627.0	629.0	Missing.
629.0	630.0	Marlstone (oil shale?): Medium brownish gray to some buff (commonly almost neutral gray), dolomitic. Massive to faintly laminated. Some tight contorted breccia and rare short open fractures with pyrite. Sample consists of 6 inches of solid core plus grab-sampled rubble with some granular calcite and pyrite as above; length uncertain.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
630.0	631.5	Oil shale: Medium to dark brownish gray (some slight olive tint), dolomitic. Faint streaked bedding. Common very fine dark submetallic needles. Common fine tan earthy streaks and some small porous calcite masses in middle part. Very regular medium to very thin shaly parting in lower part. Sample of oil shale with very fine dark submetallic needles from 631.1 feet: X-ray - dolomite, quartz, feldspar, illite, ferroan.
631.5	633.1	Oil shale: Very dark to some medium brownish gray, dolomitic. Faint streaked bedding and very fine laminae. Regular thin to thick shaly parting. Common <u>very</u> fine disseminated crystals in some parts. Common very fine gray silty streaks in middle part. A thin tan tuff streak near top; a 2-inch tan to yellow-buff silty tuff band at 632.8. Sample of tuff from 632.8 feet: X-ray - Na and K feldspars, mica.
633.1	634.1	Oil shale: Dark grayish brown to buff, dolomitic to calcareous. Faint streaked bedding to distinct laminae; very common fine buff speckles. Common very fine dark needles. A 1-1/2-inch buff to tan tuff at 633.7.
634.1	634.8	Oil shale and marlstone: Grayish brown to buff, calcareous. Faintly laminated with common faint speckles to very faintly bedded. Common very fine pyritic buff earthy specks. Broken core and rubble in lower part; length uncertain.
634.8	635.3	Missing?
635.3	636.0	Oil shale: Medium to dark brownish gray, some tan laminae and streaks; dolomitic. Faint to some distinct laminae and streaked bedding. Common very fine dark submetallic needles and blebs.
636.0	640.0	Marlstone: Buff and gray buff to light and rare medium brownish gray, calcareous. Faint laminae and streaked bedding; some massive zones. Common fine light to medium gray silty streaks. Irregular core pieces and rubble in lower part.
640.0	641.0	Missing?
641.0	642.0	Marlstone as above and some oil shale as below: Irregular core pieces and rubble; length uncertain; uneven sample split.
642.0	650.5	Missing.
650.5	651.8	Oil shale: Medium to dark brownish gray, some light brownish gray to buff in upper part; dolomitic. Faint laminae and streaked bedding. Regular thin to thick parting. Some very fine gray

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		laminae. A thin buff claystone band at 651.4. Some gray-buff marlstone rubble with abundant very fine dark gray needles and blebs at top.
651.8	653.0	Oil shale: Medium grayish brown to tan and rare buff, dolomitic. Faint to moderately distinct laminae. Some fine gray laminae, streaks, and blebs. Some fractured rubble with sparse very fine pyrite in lower part.
653.0	654.6	Marlstone and oil shale: Buff to medium grayish brown, dolomitic to slightly calcareous. Faint to distinct laminae. Some very fine dark gray laminae and rare small blebs. Some broken core; uneven sample split.
654.6	655.6	Oil shale: Medium to some dark grayish brown and brownish gray, dolomitic. Very faint streaked bedding and rare laminae. Some very thin shaly parting.
655.6	658.3	Missing.
658.3	659.5	Marlstone and mudstone: Buff to gray buff, dolomitic to slightly calcareous. Very faint laminae and streaked bedding. Mostly rubble; some irregular pieces of medium to dark brownish-gray oil shale at top; uneven sample split.
659.5	660.0	Missing?
660.0	662.1	Oil shale: Medium to light and rare dark brownish gray and grayish brown, dolomitic. Fairly distinct to faint laminae and some streaked bedding. Some very fine dark gray laminae and streaks.
662.1	663.4	Marlstone: Buff to some light and rare medium grayish brown, dolomitic to slightly calcareous. Faint and rare distinct laminae; rare thin cross-laminated zones. A 1/2-inch massive gray slightly silty band at 663.2.
663.4	664.5	Oil shale: Medium to some light brownish gray and grayish brown, dolomitic. Faint to some moderately distinct laminae. Fairly common fine dark gray laminae. Sample of brownish-gray oil shale from 663.7 feet: X-ray - dolomite, K and Na feldspars, ferroan.
664.5	665.7	Oil shale: Medium to light brownish gray, dolomitic. Faintly laminated. Some fine gray laminae.
665.7	666.7	Oil shale: Medium to some dark brownish gray, dolomitic. Faint laminae and some very faint streaked bedding. Fairly common fine gray laminae and streaks.
666.7	667.7	Oil shale: Medium grayish brown, dolomitic. Faint laminae and some very faint streaked bedding. Some fine gray laminae.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
667.7	668.7	Oil shale: Medium to some very dark brownish gray and grayish brown, rare tan to buff; dolomitic. Very faint streaked bedding to faint and some distinct laminae. Irregular to regular, thick to some thin parting. Some very fine gray streaks and laminae in upper part. Some fine gray limonite-stained stringers and streaks in lower part.
668.7	668.9	Missing?
668.9	669.7	Mudstone: Buff to light brownish gray and tan, silty to very fine sandy textured, slightly calcareous to dolomitic. Faintly laminated; some fine loop structures and displacements.
669.7	671.5	Mudstone: Buff and gray buff to some light brownish gray, silty to marly, slightly calcareous. Faintly laminated with some massive bands; some fine to small displacements.
671.5	675.0	Missing.
675.0	676.0	Oil shale: Very dark to some medium grayish brown, dolomitic. Faint streaked bedding; slightly curved and inclined in lower part. Irregular surface with some boxworks at base. Uneven sample split.
676.0	676.2	Missing?
676.2	677.3	Oil shale: Medium brownish gray to buff, dolomitic. Faint to some moderately distinct laminae and streaked bedding. Irregular broken core pieces at top.
677.3	682.0	Oil shale, marlstone, and mudstone: Light and some medium brownish gray to very light buff and some tan, dolomitic to slightly calcareous. Faint to moderately distinct laminae; some very thick massive mudstone bands. Some irregular core pieces.
682.0	683.9	Marlstone: Buff to tan and light brownish gray, dolomitic, some slightly silty. Faintly laminated. Some gray-buff siltstone laminae and thin irregular bands.
683.9	685.0	Missing.
685.0	686.0	Marlstone: Buff and gray buff to light brownish gray, dolomitic, slightly silty. Faintly laminated. Mostly rubble; length doubtful; grab sampled.
686.0	686.5	Missing?
686.5	687.3	Marlstone and oil shale: Buff to rare tan marlstone in upper half; tan to brown and rare dark grayish-brown oil shale in lower half. Faint to moderately distinct laminae. Chalky white material on some parting surfaces. Broken core and rubble near top.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
687.3	687.9	Oil shale: Dark grayish brown, dolomitic. Faint streaked bedding and very fine laminae; wavy in middle part. Irregular vuggy limonite-stained surfaces at 687.5.
687.9	689.0	Marlstone: Light to some medium brownish gray, dolomitic. Faint laminae in upper 0.2 foot; very faint streaked bedding in other parts. Rare fine light gray silty streaks. A vertical fracture with very fine patchy brownish-black organic coatings in lower 0.3 foot.
689.0	690.0	Oil shale: Light to medium and rare dark grayish brown, dolomitic. Very faint to moderately distinct laminae and bands. A tight discontinuous high angle fracture with resinous black coatings extends through most of the interval.
690.0	694.5	Oil shale: Dark brownish gray to nearly black, dolomitic. Faint streaked bedding and rare very fine laminae. Rare fine grayish-brown silty crystalline streaks. A 0.1-foot faintly bedded brownish-gray silty tuff (?) band at 692.4. Sample of tuff from 692.4 feet: X-ray - K feldspar, pyrite, marcasite.
694.5	697.3	Marlstone: Buff to light and rare medium brownish gray, dolomitic. Faint laminae and streaked bedding; massive buff band at 695.0-695.3. Some fine silty streaks.
697.3	698.3	Oil shale: Light to medium brownish gray, dolomitic. Very faint laminae and streaked bedding.
698.3	699.2	Oil shale: Dark to medium and some light brownish gray, dolomitic. Faint streaked bedding and rare laminae.
699.2	700.2	Oil shale: Very dark to rare medium brownish gray, dolomitic. Very faint streaked bedding. Some <u>very</u> fine disseminated crystals in upper part. Sample of very dark oil shale with some very fine disseminated crystals from 699.4 feet: X-ray - quartz, dolomite, analcite, illite, ferroan, pyrite.
700.2	701.3	Oil shale: Very dark to some medium brownish gray, dolomitic. Very faint streaked bedding. Some <u>very</u> fine disseminated crystals. Some fine medium brownish-gray to buff silty-textured laminae and stringers in lower part.
701.3	702.4	Mudstone: Buff to light and rare medium brownish gray, dolomitic, silty. Faint streaked bedding and some laminae. Some very fine sandy-textured streaks.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of silty mudstone from 701.7 feet: X-ray - quartz, dolomite, feldspar, calcite.
702.4	702.8	Missing?
702.8	704.0	Mudstone: Buff to tan and rare medium grayish brown, dolomitic to slightly calcareous, silty. Faint streaked bedding and rare moderately distinct laminae. Common very fine sandy-textured streaks in upper part.
704.0	705.0	Mudstone and marlstone: Buff to light and rare medium brownish gray, slightly calcareous, mostly silty. Faint streaked bedding and some laminae.
705.0	707.0	Marlstone: Buff to light brownish gray, medium brownish-gray oil shale at 705.1-705.3 and 706.4-706.7; dolomitic to slightly calcareous. Faint streaked bedding and laminae; some very faintly bedded to massive thick bands in upper part. Discontinuous tight high angle fractures with brown coatings at 705.5-705.7 and 706.0-706.2.
707.0	708.0	Oil shale: Medium brownish gray, dolomitic. Very faint streaked bedding.
708.0	710.0	Oil shale: Medium to dark brownish gray, dolomitic. Faint streaked bedding. Some fine to very small irregular brownish-gray to gray silty crystalline blebs and rare 1/2-inch dense brown dolomite lenses in upper part. Sample of oil shale with silty crystalline blebs from 708.4-708.7 feet: X-ray - dolomite, quartz, feldspar, calcite, ferroan, pyrite.
710.0	711.0	Oil shale: Very dark brownish gray to some black, dolomitic. Very faint streaked bedding. Rare fine crystalline streaks. A very irregular 0.1-foot grayish-brown dense to silty stringer at 710.1.
711.0	713.0	Oil shale: Dark brownish gray to rare black, dolomitic. Faint streaked bedding. Common very fine dark gray silty pyritic streaks in some zones; some fine to thin stringers in upper part. Rare thin to fine grayish-brown silty streaks.
713.0	714.0	Oil shale: Very dark brownish gray to medium grayish brown, dolomitic. Faint streaked bedding. Rare fine brittle vitreous black organic streaks. Some irregular slabby core pieces; uneven sample split.

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Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
714.0	716.4	Marlstone: Buff and tan to light brownish gray, some medium grayish brown in lower part; dolomitic to slightly calcareous. Faint to moderately distinct streaked bedding and very fine laminae. Some high angle fracture surfaces with resinous brown and earthy white coatings. Mostly irregular slabby core pieces; uneven sample split.
716.4	717.4	Oil shale: Light to medium and some dark grayish brown, dolomitic. Moderately distinct to faint streaks and laminae. Irregular slabby core pieces; uneven sample split.
717.4	719.5	Marlstone and mudstone: Buff and tan to some medium grayish brown, slightly calcareous to calcareous, common silty streaks. Faint to moderately distinct streaks and laminae; some fine to small irregular displacements. Some short tight high angle fractures.
719.5	722.5	Marlstone and some mudstone: Buff to tan and rare grayish brown, calcareous. Moderately distinct streaks and laminae to some very faintly bedded zones. Sample of very faintly bedded buff marlstone from 720.9 feet: X-ray - dolomite, quartz, calcite, feldspar, ferroan, dawsonite?
722.5	724.5	Oil shale: Medium grayish brown, dolomitic. Moderately distinct to very faint streaked bedding. Some very fine light gray to gray-buff silty streaks in lower part.
724.5	725.5	Oil shale: Medium to rare dark grayish brown, dolomitic. Faint streaked bedding to nearly massive. Some very fine gray silty streaks in upper part.
725.5	727.7	Oil shale: Medium to dark grayish brown and brown, dolomitic. Very faint streaked bedding to nearly massive. Some fine dark gray and brownish-gray silty crystalline blebs. Rare very fine pyrite blebs. Conchoidal fracture. Sample of dark brown oil shale from 727.4 feet: X-ray - dolomite, quartz, analcite, feldspar, illite.
727.7	730.3	Oil shale: Medium brown and grayish brown, some tan in upper part; dolomitic. Very faint streaked bedding to massive. Some fine buff dense to silty crystalline streaks and lenses. Conchoidal fracture.
730.3	731.6	Oil shale: Medium to some dark grayish brown and brown, dolomitic. Very faintly bedded to massive. Conchoidal to irregular fracture.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
731.6	733.6	Oil shale: Medium to very dark grayish brown, dolomitic. Faint to moderately distinct streaked bedding. Some irregular broken core pieces in upper part; uneven sample split.
733.6	734.6	Oil shale: Medium to dark grayish brown, dolomitic. Moderately distinct to faint streaked bedding. A large irregular dense grayish-brown dolomite nodule at 734.1; rare small lenses in other parts.
734.6	737.6	Oil shale: Dark grayish brown to some black, dolomitic. Faint streaked bedding and very fine laminae. Some very fine pyrite blebs and streaks in middle part. Conchoidal fracture. Rare very fine resinous black streaks in lower part (possibly gar scales).
737.6	738.6	Oil shale: Dark grayish brown to tan and buff, dolomitic. Faint to moderately distinct laminae with common fine displacements and rare loop structures in lean zone at 737.8-738.2; faint streaked bedding in other parts. A 1-1/2-inch brownish-gray to tan stringer at top with small oil-stained silty porous patches and some irregular fractures with pyrite. Some gray streaks near base. Sample of brownish-gray stringer from 737.6 feet: X-ray - K feldspar; some pyrite, marcasite.
738.6	740.0	Oil shale: Medium to dark grayish brown and brownish gray, dolomitic. Faint streaked bedding and some laminae. Rare fine to small brown silty crystalline streaks and blebs in upper part. Thin dark gray slightly silty stringers at 739.5 and 739.7. Sample of dark gray stringer from 739.5 feet: X-ray - pyrite, marcasite, feldspar, dolomite, dawsonite?
740.0	741.0	Oil shale: Dark and some medium grayish brown, dolomitic. Very faint streaked bedding.
741.0	744.1	Oil shale: Very dark grayish brown to some medium brown, dolomitic. Faint streaked bedding to faint and some moderately distinct laminae. Rare thin to fine streaks of concentrated gar scales--some partly pyritized. A very thin silty tuff layer at 742.8; tan to brown in upper part, dark gray and pyritic in lower part. A 1/2-inch dark gray silty pyritic band at 743.4 (like 739.5 feet). Sample of very dark oil shale from 741.7 feet: X-ray - quartz, illite, feldspar, dolomite, ferroan, pyrite?
744.1	749.0	Marlstone and mudstone: Very light buff to light brownish gray, slightly calcareous to calcareous. Faintly laminated with some

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		slightly cross-laminated zones; some very thick zones of massive buff mudstone in middle part. Very common fine light gray silty streaks.
749.0	750.0	Marlstone: Buff and tan to light brownish gray, calcareous. Moderately distinct to faint laminae. Common fine light to medium gray silty streaks.
750.0	751.0	Oil shale: Light to medium brownish gray and grayish brown, slightly calcareous. Faint to moderately distinct laminae. Some very fine gray silty streaks in upper part.
751.0	752.0	Marlstone: Buff to light brownish gray, slightly calcareous. Faintly laminated with some massive bands. Some gray-buff to light gray silty streaks.
752.0	753.1	Oil shale: Light and some medium brownish gray in upper part to tan and grayish brown in lower part, slightly calcareous to dolomitic. Faint to fairly distinct laminae. Common light gray silty streaks and laminae in upper part. Sample of tan to grayish-brown laminated oil shale from 752.8 feet: X-ray - dolomite, quartz, illite, analcite, feldspar, calcite.
753.1	755.1	Oil shale: Medium to some dark grayish brown, dolomitic. Faint streaked bedding and some laminae.
755.1	756.2	Oil shale: Dark to some medium grayish brown, dolomitic. Faint very fine laminae and streaked bedding. A 0.1-foot brownish-gray very fine blebby-textured tuff stringer with common very fine gray analcite crystals at 755.3. A fine gray silty crystalline lamina at 755.8. Sample of tuff from 755.3 feet: X-ray - quartz, dawsonite, analcite, feldspar, pyrite, marcasite.
756.2	758.1	Marlstone: Buff and tan to rare medium and dark grayish brown, calcareous. Faint to moderately distinct laminae. Some fine gray-buff to gray silty streaks in upper part becoming rare in lower part.
758.1	759.0	Oil shale: Medium to very dark grayish brown, dolomitic. Faint laminae to very faint streaked bedding. Rare fine dark gray silty pyritic (?) streaks. A 1- x 2-inch dense brown dolomite nodule at 758.7.
759.0	760.0	Oil shale: Very dark to some medium grayish brown, some very fine black satiny streaks; dolomitic. Faint streaked bedding. Rare small dense brown dolomite lenses.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
760.0	762.0	Oil shale: Very dark grayish brown becoming medium grayish brown in lower 0.2 foot, very common very fine black satiny streaks; dolomitic. Very faint streaked bedding. Some fine to small dolomite lenses and streaks. Some irregular 1/2-inch brown slightly blebby streaks at 762.3. Sample of blebby brown streak from 762.3 feet: X-ray - quartz, analcite, dolomite, feldspar.
762.0	763.0	Oil shale and marlstone: Medium to light brownish-gray oil shale with faint streaked bedding and displaced laminae in upper part grading to dense massive buff marlstone in lower part, slightly calcareous. Common fine gray silty streaks and blebs in upper part. Irregular core pieces; uneven sample split.
763.0	765.0	Marlstone and mudstone: Buff to light brownish gray, slightly calcareous. Massive to faint streaked bedding. Some fine gray silty streaks. Mostly rubble and very irregular core pieces; grab sampled. Sample of massive light brownish-gray marlstone from 764 feet: X-ray - dolomite, quartz, illite, calcite, feldspar, analcite.
765.0	769.0	Mudstone and marlstone: Very light buff to light brownish gray and rare tan, slightly calcareous. Very faintly laminated; some thick massive zones. Common fine light to medium gray silty streaks. Some vertical fracture surfaces with blebby to drusy calcite crusts.
769.0	769.9	Marlstone: Buff to light and rare medium brownish gray, slightly calcareous. Faint to moderately distinct laminae. Common fine light gray silty streaks.
769.9	771.0	Oil shale: Buff to medium grayish brown, slightly calcareous to dolomitic. Moderately distinct laminae in upper part to very faint streaked bedding in lower part.
771.0	772.0	Oil shale: Grayish brown to tan and some buff, slightly calcareous. Faint to moderately distinct laminae; common fine displacements. Some irregular shaly parting.
772.0	773.0	Oil shale: Medium to dark grayish brown and brown, dolomitic. Faintly laminated. A 1/2-inch dark gray silty band at 772.6. Some irregular shaly parting.
773.0	774.2	Oil shale: Very dark to medium grayish brown, dolomitic. Very faint to some moderately distinct laminae. Very common very

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		fine buff slightly earthy specks on some parting surfaces. Rare fine gray to brownish-gray silty crystalline pyritic laminae and streaks. Regular thick parting; fine hackly fracture.
		Sample of dark oil shale with very fine buff specks from 773.8 feet: X-ray - quartz, illite, dolomite, feldspar, analcite, ferroan, pyrite.
774.2	775.0	Oil shale: Tan to buff and light brownish gray, calcareous. Faintly laminated. Common fine gray-buff to light gray silty streaks.
775.0	776.0	Marlstone: Very light buff to tan and rare brown, calcareous. Fairly distinct laminae. Some fine buff silty streaks and laminae.
776.0	779.0	Mudstone and marlstone: Buff white to buff, some tan to brown oil-shale zones in middle part; calcareous. Faint to rare distinct laminae and streaked bedding. Very common gray-buff to light gray silty streaks.
779.0	781.0	Marlstone: Very light buff to some tan, calcareous. Faint to some moderately distinct laminae; some fine loop structures and displacements. Some buff to gray-buff silty streaks.
781.0	781.9	Marlstone: Buff to tan and rare brown, calcareous. Faint to some distinct laminae; common fine loop structures and displacements. Some buff silty streaks.
781.9	782.6	Oil shale: Tan to medium and some dark grayish brown, calcareous to dolomitic. Fairly distinct to faint laminae in upper part; distinct streaked bedding in lower part.
782.6	784.9	Oil shale: Medium grayish brown, very dark in upper 0.2 foot; dolomitic. Very faint streaked bedding to nearly massive. Conchoidal fracture.
784.9	785.9	Oil shale: Dark grayish brown, dolomitic. Very faint streaked bedding.
785.9	787.0	Oil shale: Dark grayish brown to tan and buff, dolomitic to slightly calcareous. Faint to moderately distinct laminae; common fine displacements in lower part.
787.0	788.1	Marlstone: Buff and tan to rare medium grayish brown, slightly calcareous. Moderately distinct laminae; some fine displacements. Some very fine light gray silty streaks.
788.1	789.2	Oil shale: Tan to medium and rare dark grayish brown, some buff in upper part; slightly calcareous. Moderately distinct to faint

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Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		laminae; some fine displacements and loop structures. Some thin to fine gray silty pyritic streaks in lower part.
789.2	790.9	Oil shale: Buff to medium grayish brown and brownish gray, dolomitic. Faint laminae in upper part to very faint streaked bedding in lower part. Rare fine gray streaks and blebs.
790.9	791.7	Oil shale: Grayish brown to some tan, slightly calcareous. Moderately distinct laminae to faint streaked bedding. Irregular thick to thin parting. A thin dark gray silty pyritic lamina in middle.
791.7	792.4	Marlstone: Buff and tan to rare medium grayish brown and brownish gray, calcareous. Faint laminae and streaked bedding. Some fine light gray silty streaks.
792.4	793.5	Oil shale: Tan and buff to some medium grayish brown, slightly calcareous. Faint to some moderately distinct laminae and streaked bedding.
793.5	794.5	Oil shale: Medium to some light and rare dark grayish brown and brownish gray, dolomitic. Faint laminae and streaked bedding.
794.5	795.5	Oil shale: Medium to some dark grayish brown and brownish gray, dolomitic. Very faint streaked bedding.
795.5	796.5	Oil shale: Dark and some medium brownish gray, dolomitic. Faint streaked bedding. A 0.1-foot dark brownish-gray silty to very fine sandy-textured tuff band at 796.2. Sample of tuff from 796.2 feet: X-ray - quartz, analcite, marcasite, pyrite, feldspar.
796.5	797.5	Oil shale: Very dark brownish gray, dolomitic. Very faint streaked bedding. Regular thick to rare thin parting. Rare <u>very</u> fine disseminated crystals.
797.5	798.6	Oil shale: Medium to some light brownish gray and grayish brown, dolomitic. Very faint streaked bedding and some faint laminae. A thin zone of common irregular gray slightly silty streaks near top.
798.6	799.6	Oil shale: Medium to light brownish gray and grayish brown, slightly calcareous. Faint to some moderately distinct streaked bedding and laminae. Rare fine dark gray pyritic streaks in upper part. Some very fine medium to light gray slightly silty laminae in middle part.
799.6	800.6	Oil shale: Medium and very rare dark brownish gray and grayish brown to light brownish gray and buff, slightly calcareous. Faint

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		to some distinct laminae; some fine loop structures. Two vertical fractures with very fine drusy calcite and chalky white specks in lower half.
800.6	801.6	Oil shale: Medium to some light and dark brownish gray and grayish brown, slightly calcareous to dolomitic. Moderately distinct to faint laminae; some fine loop structures and displacements. Some very fine gray crystalline streaks and blebs at 800.9. Sample of oil shale with some very fine gray crystalline streaks and blebs from 800.9 feet: X-ray - dolomite, quartz, analcite, feldspar, pyrite, illite.
801.6	802.6	Oil shale: Medium to dark grayish brown, some light in upper part; dolomitic. Faint laminae in upper part to faint streaked bedding in lower part; some very fine loop structures. Rare fine dark gray pyritic streaks in upper part.
802.6	806.7	Oil shale: Very dark brownish gray to some black, some very slight satiny luster; dolomitic. Very faint streaked bedding. Very rare fine brown crystalline streaks in lower part. Sample of very dark oil shale from 804.9 feet: X-ray - quartz, illite, dolomite, feldspar, ferroan, pyrite.
806.7	807.9	Oil shale: Dark to medium grayish brown, dolomitic. Faint streaked bedding. Rare fine brown to brownish-gray crystalline streaks and very small blebs. Very rare fine dark gray pyritic streaks. Sample of oil shale with very small to fine crystalline blebs and streaks from 807.7 feet: X-ray - ferroan, quartz, dolomite, analcite.
807.9	809.7	Oil shale: Medium brown to brownish gray, dolomitic. Faint streaked bedding; some very fine laminae in middle part. Some fine brown to brownish-gray crystalline blebs and streaks. Rare fine dark gray pyritic streaks and blebs.
809.7	810.7	Oil shale: Dark and rare medium grayish brown, dolomitic. Very faint streaked bedding. Common fine to very small brownish-gray crystalline blebs and streaks. A large dense blebby brown dolomite lens in middle.
810.7	813.1	Oil shale: Dark grayish brown to black, some satiny luster; dolomitic. Very faint streaked bedding in upper part to very

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		fine laminae in lower part. Some fine brownish-gray crystalline blebs and streaks and rare fine to thin dense dolomite streaks in upper part. Irregular thin shaly parting and hackly fracture in lower 0.3 foot.
813.1	814.6	Oil shale: Dark to medium grayish brown, dolomitic. Faintly laminated; some fine loop structures and displacements. Some small brownish-gray crystalline blebs at 813.6. Common fine to thick dense tan to buff dolomite stringers at 813.9-814.1. Dark gray silty-textured pyritic laminae at 813.8 and 814.1.
814.6	819.3	Mudstone and marlstone: Very light buff to tan and light brownish gray, some thick zones of medium to rare dark grayish-brown oil shale in middle part; slightly calcareous. Faint to some fairly distinct laminae and streaks. Common fine to thin gray-buff silty streaks and laminae. A high angle fracture with drusy to blebby calcite crusts at 817.6-818.4.
819.3	822.0	Marlstone: Buff to rare light brownish gray, some thick medium to rare dark oil-shale zones in upper part; slightly calcareous. Very faint and rare distinct laminae and streaked bedding. Some gray-buff silty streaks and laminae. A high angle fracture with drusy to blebby calcite from 819.8 to base.
822.0	823.6	Oil shale: Light to some medium brownish gray and some buff, dolomitic. Moderately distinct laminae to very faint streaked bedding and some thick nearly massive zones. Some fine gray-buff to light gray silty streaks and laminae. Some irregular fractures with calcite in lower part.
823.6	824.6	Oil shale: Light to medium brownish gray, dolomitic. Faint to some moderately distinct laminae and streaked bedding. Some fine silty streaks and laminae.
824.6	825.8	Oil shale: Medium to dark grayish brown and very rare black, dolomitic. Faint to some moderately distinct laminae and streaked bedding.
825.8	826.8	Oil shale: Very dark brownish gray to some black, some satiny luster and very rare resinous streaks; dolomitic. Very faint streaked bedding. Rare small grayish-brown crystalline blebs and fine streaks.
826.8	827.9	Oil shale: Dark to medium grayish brown and rare tan, some black satiny to resinous streaks and laminae in lower part; dolomitic.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Faint to some distinct streaked bedding; fairly distinct laminae with some fine to small loop structures in lower 0.2 foot. A 1/2-inch pinched out layer of dense brown dolomite at 827.1. Common fine brown dense to silty crystalline streaks in black oil shale near base.
827.9	831.0	Marlstone: Very light buff to rare tan, slightly calcareous. Very faintly bedded to laminated. Common fine gray silty streaks and laminae; rare dark gray pyritic streaks in lower part. An irregular high angle fracture with sparse calcite and very fine pyrite in middle part.
831.0	832.0	Marlstone: As above but rare silty streaks.
832.0	833.0	Marlstone: Buff to tan and some medium grayish brown, slightly calcareous to dolomitic. Very faint to moderately distinct laminae. Some very fine light to medium gray, dense to silty crystalline streaks and laminae.
833.0	833.4	Oil shale: Medium to light brownish gray and some tan to buff, dolomitic. Faint to moderately distinct laminae. Fairly common very fine gray silty laminae (some pyritic).
833.4	834.0	Oil shale: Medium to rare dark grayish brown, dolomitic. Faintly laminated. Some pieces of tan to buff marlstone. Very irregular broken core pieces. Some irregular fracture surfaces with slight chalky to crusty white calcite coatings and some with reddish-brown resinous coatings. Sample length doubtful; grab sampled.
834.0	835.0	Oil shale: Medium to some dark grayish brown, rare tan in upper part; dolomitic. Faint laminae in upper part to streaked bedding in lower part. Rare fine to very small, dark to medium grayish-brown crystalline blebs and streaks in lower part. Sample of faintly laminated medium grayish-brown oil shale from 834.3 feet: X-ray - dolomite, quartz, analcite, illite, feldspar.
835.0	837.1	Oil shale: Very dark grayish brown, rare very fine resinous black streaks; dolomitic. Faint streaked bedding; some very faint very fine laminae in lower part. A 1/2-inch tuff (?) band at 836.2; tan in upper 1/8 inch and dark gray in lower part. Rare very fine crystalline streaks in lower part. Rare waxy black fish (?) fragments from 836.7 to 836.9. Sample of dark gray and tan slightly silty band from 836.2 feet: X-ray - feldspar, quartz, pyrite, marcasite, ferroan.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
837.1	839.0	Marlstone: Tan to buff and rare medium brown and grayish brown, dolomitic to slightly calcareous. Very faint streaked bedding to faint and rare distinct laminae; some very fine loop structures and displacements. Some fine gray silty blebs and streaks in upper part. A high angle fracture with slight chalky calcite coatings extends through interval; in some parts there are more than one fracture. Uneven sample split.
839.0	843.6	Marlstone: Very light buff to rare tan and brown, calcareous. Faint and rare distinct laminae. Common fine to thin gray-buff to buff and rare grayish-brown silty streaks and laminae. High angle fractures with some calcite and some with brown coatings in upper part. Sample of thin buff silty streak from 842.2 feet: X-ray - quartz, dolomite, calcite, feldspar, dawsonite, ferroan.
843.6	846.0	Marlstone: Buff to tan and rare grayish brown, calcareous to dolomitic. Faint and rare distinct laminae in upper part to very faint streaked bedding in lower part. Some fine to thin gray-buff to light brownish-gray silty laminae and streaks. A high angle fracture with chalky to blebby calcite extends through interval. Some irregular core pieces; uneven sample split.
846.0	847.0	Oil shale: Tan to medium and rare dark brown, dolomitic. Faint laminae to some very faint streaked bedding. Some fine gray-buff silty streaks in upper part.
847.0	849.0	Oil shale: Medium to some dark grayish brown, dolomitic. Faint streaked bedding.
849.0	850.0	Oil shale: Medium to very dark grayish brown, dolomitic. Faint laminae and some streaked bedding. A thin dark brown dense blebby dolomite stringer at 849.2.
850.0	851.4	Oil shale: Medium to dark grayish brown, dolomitic. Faint laminae and streaked bedding. Rare fine dark brownish-gray dense to silty crystalline streaks and blebs. A 1-3/4-inch gray to buff-white silty tuff at 850.3; riddled by very fine tight fractures. Character of rock changes very abruptly at base. Sample of gray to buff-white fractured tuff from 850.3 feet: X-ray - K feldspar, pyrite. Sample of dark to medium grayish-brown oil shale from 851.3 feet: X-ray - dolomite, quartz, feldspar, calcite, pyrite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
851.4	853.4	Oil shale (?): Medium to some light brownish gray, dolomitic. <u>Very</u> faintly bedded. Hard and dense; conchoidal fracture. A smooth high angle fracture with patchy brown coatings in lower part. Uneven sample split. Sample of hard dense oil shale from 851.5 feet: X-ray - dolomite, quartz, illite, analcite, feldspar, ferroan.
853.4	855.6	Oil shale: Medium to rare dark brownish gray, dolomitic. Very faint streaked bedding. Irregular thick to rare thin parting; some conchoidal fracture.
855.6	856.6	Oil shale: Dark brownish gray, dolomitic. Very faint streaked bedding.
856.6	857.6	Oil shale: Dark to medium brownish gray, dolomitic. Very faint streaked bedding and some laminae. Rare small dense brown dolomite lenses.
857.6	859.6	Oil shale: Medium to some light brownish gray, dolomitic. Very faint laminae and streaked bedding. Some fine dense gray laminae in upper part.
859.6	862.3	Oil shale: Medium to light brownish gray, dolomitic. Faint laminae and streaked bedding; some very thick dense massive zones with conchoidal fracture. Rare fine dense gray laminae and streaks. A vertical fracture with patchy brown to black resinous crusts in lower 0.4 foot.
862.3	863.6	Oil shale: Medium to some light brownish gray, dolomitic. Very faintly bedded to massive. Dense, conchoidal fracture.
863.6	866.3	Oil shale: Medium to dark grayish brown, dolomitic. Faint streaked bedding and rare laminae. Mostly dense with conchoidal fracture. Very rare small grayish-brown silty crystalline blebs.
866.3	867.5	Oil shale: Medium to some light and dark brownish gray, dolomitic. Faint laminae and streaked bedding; some fine to small displacements.
867.5	870.0	Oil shale: Medium to light and rare dark brownish gray and grayish brown, dolomitic to slightly calcareous. Faint laminae and streaked bedding. Rare fine gray silty pyritic laminae and streaks.
870.0	872.0	Oil shale: Medium brownish gray, dolomitic. Very faint streaked bedding and very fine laminae. A 1-inch hard dense massive brownish-gray dolomite band at 870.7. Few fine dark gray pyritic streaks in lower part.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
872.0	874.0	Oil shale: Medium to dark brownish gray, dolomitic. Faint streaked bedding and some laminae. Some very irregular fine dark gray pyritic streaks in lower part. Rare gar scales (?) near base.
874.0	876.3	Oil shale: Medium to some light brownish gray, dolomitic. Faint streaked bedding to nearly massive. A smooth vertical fracture with very fine patchy mineral crusts (dolomite?) and slight brown stains in upper 3 inches. Rare very fine gray silty crystalline streaks in middle part. Fairly dense; conchoidal fracture.
876.3	877.4	Oil shale: Medium to rare dark brownish gray, dolomitic. Very faintly bedded to massive. Dense; conchoidal fracture.
877.4	878.4	Oil shale: Medium to some dark brownish gray, dolomitic. Nearly massive in upper part to faintly laminated in lower part. A vertical fracture with very fine mineral crusts and slight brown stains at 877.5-877.7. Very abrupt change to buff mudstone at base.
878.4	882.4	Mudstone: Very light buff to light brownish gray, calcareous to slightly calcareous. Moderately distinct to faint laminae; rare thin slightly cross-laminated zones; some thick massive zones in middle and lower parts. Sample of buff to light brownish-gray laminated mudstone from 878.7 feet: X-ray - dolomite, quartz, calcite, feldspar.
882.4	883.4	Oil shale: Light to some medium brownish gray, slightly calcareous to dolomitic. Moderately distinct laminae in upper part to very faint laminae and streaked bedding in lower part. Some very fine gray silty crystalline laminae and streaks.
883.4	884.7	Oil shale: Medium to some dark brownish gray, dolomitic. Faint laminae to very faint streaked bedding. Dense; conchoidal fracture. Sample of very faintly bedded dense oil shale from 884.1 feet: X-ray - dolomite, quartz, feldspar, analcite.
884.7	887.0	Oil shale: Dark to medium brownish gray, dolomitic. Faint streaked bedding. Rare very irregular fine dark gray pyritic streaks. A very irregular dense brown to tan dolomite stringer with very faint contorted and displaced unconformable internal laminae at 885.7-886.0.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Sample of oil shale with pyritic streaks from 885.1 feet: X-ray - pyrite, dolomite, quartz, feldspar, analcite.
887.0	888.3	Oil shale: Very dark to rare medium brownish gray, dolomitic. Faint streaked bedding.
888.3	889.3	Oil shale: Dark to medium brownish gray and grayish brown, dolomitic. Faint streaked bedding. Dense; conchoidal fracture. A thin band of massive brown dolomite at top. Rare fine dark gray slightly silty streaks and blebs in lower part.
889.3	890.7	Oil shale: Medium grayish brown, dolomitic. Very faint streaked bedding. Dense; conchoidal fracture. Rare fine dark gray slightly silty lenses and blebs.
890.7	891.7	Oil shale: Medium to rare dark grayish brown, dolomitic. Very faint streaked bedding to nearly massive; some faintly laminated oil-shale zones in lower part terminate laterally without distortion in jagged contact with dense nearly massive oil shale. Some very irregular gray pyritic patches and streaks in middle part.
891.7	892.7	Oil shale: Medium to some dark grayish brown, dolomitic. Very faint streaked bedding and very fine laminae. Slightly irregular thick to medium parting.
892.7	894.9	Oil shale: Very dark to medium grayish brown and brownish gray, dolomitic. Very faint streaked bedding and very fine laminae--some in moderately distinct thin lighter and darker zones. Fairly regular to irregular, thick to some thin parting. Some fine dark gray pyritic streaks and stringers near top. Sample of dark brownish-gray oil shale with thin shaly parting from 894.8 feet: X-ray - illite, quartz, dolomite, feldspar, ferroan, analcite, pyrite.
894.9	895.9	Oil shale: Dark to medium brownish gray, dolomitic. Very faint to faint laminae and streaked bedding. Fairly regular medium to thick parting.
895.9	897.0	Oil shale: Dark to very dark grayish brown, dolomitic. Faint streaked bedding; distorted near top. Irregular thick to rare thin parting. A 0.1- to 0.2-foot dense blebby brown dolomite stringer at top with wavy upper contact and very irregular lower contact; some small to fine dolomite nodules down to 896.2. Sample of dense blebby brown dolomite from 896.0 feet: X-ray - dolomite, some quartz.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
897.0	898.0	Oil shale: Very dark to rare medium grayish brown, dolomitic. Faint streaked bedding and some laminae. Irregular to fairly regular, medium to thick parting.
898.0	900.0	Oil shale: Dark to medium grayish brown, dolomitic. Faint streaked bedding and some laminae. Fairly regular to irregular, thick to some thin parting. Very rare thin dense blebby brown dolomite stringers.
900.0	901.0	Oil shale: Medium and some dark grayish brown and brownish gray, dolomitic. Faint laminae and streaked bedding. Irregular thick to thin parting; some slightly unctuous. Rare very fine gray silty streaks.
901.0	903.3	Oil shale: Medium to light grayish brown and brownish gray, dolomitic to slightly calcareous. Moderately distinct to faint laminae; rare fine to small displacements. Common fine light to medium gray, dense to silty crystalline streaks and laminae in upper part. A thin dense massive grayish-brown dolomite band at 902.4. Sample of oil shale with common gray streaks and laminae from 901.8 feet: X-ray - quartz, dolomite, analcite, feldspar, illite.
903.3	904.3	Oil shale: Medium to some light grayish brown and brownish gray, dolomitic. Faint laminae and streaked bedding. Some fine light brownish-gray dense to silty crystalline streaks.
904.3	907.3	Oil shale: Medium to rare dark grayish brown, dolomitic. Faint streaked bedding and some discontinuous laminae in upper foot; faint very fine smooth laminae and some streaked bedding in other parts. Some fairly regular medium to thin parting. Rare fine light brownish-gray to gray, dense to silty streaks.
907.3	908.8	Oil shale: Medium to dark brownish gray, dolomitic. Very faint laminae and streaked bedding. Irregular thick to some thin parting.
908.8	910.0	Oil shale: Very dark to rare medium brownish gray, dolomitic. Very faint streaked bedding and very fine laminae. Irregular thick to rare thin parting. Rare fine gray silty crystalline blebs and streaks.
910.0	911.0	Oil shale: Very dark brownish gray to black, some very slight satiny luster; dolomitic. Very faint streaked bedding. Slightly

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		irregular thick to some thin parting. Common <u>very</u> fine silty-textured pyrite streaks.
		Sample of black oil shale from 910.2 feet: X-ray - quartz, illite, feldspar, dolomite, ferroan, pyrite, calcite.
911.0	912.1	Oil shale: Very dark to rare medium brownish gray, dolomitic. Very faint streaked bedding and some very fine laminae. Some very fine pyrite streaks.
912.1	913.1	Oil shale: Very dark to some medium brownish gray, dolomitic. Faint laminae and streaked bedding. Fairly regular thick to some thin shaly parting. Rare very fine pyrite streaks and stringers.
913.1	914.1	Oil shale: Dark grayish brown to tan, dolomitic. Fairly distinct to faint streaked bedding in distinct thick to thin, light and dark zones.
914.1	915.1	Oil shale: Dark to medium brownish gray and some grayish brown to rare tan, dolomitic. Faint streaked bedding.
915.1	916.1	Oil shale: Very dark brownish gray to medium grayish brown, dolomitic. Very faint to some fairly distinct laminae and streaked bedding. Irregular thick to rare thin parting.
916.1	917.1	Oil shale: Dark to rare medium brownish gray, dolomitic. Faint streaked bedding. Very rare very fine pyritic streaks. Few shiny black to brown chips at 916.4 (possibly gar-scale fragments). Irregular thick to rare thin parting.
917.1	919.0	Oil shale: Medium and rare dark grayish brown to tan and some medium to light brownish gray, dolomitic to slightly calcareous. Faint to some fairly distinct laminae and streaked bedding. Irregular to regular, thick to medium parting. Very rare fine to small, medium to very dark brownish-gray, dense to very fine crystalline streaks and blebs.
		Sample of tan to grayish-brown oil shale with dark dense to very fine crystalline streaks and blebs from 917.8 feet: X-ray - dolomite, quartz, analcite, illite, feldspar.
919.0	920.0	Oil shale: Medium to dark brownish gray, dolomitic. Faint to fairly distinct streaked bedding; some dark streaks have jagged shredded ends. Rare fine dark brownish-gray dense to very fine crystalline blebs and streaks.
920.0	921.0	Oil shale: Black to dark and some medium brownish gray, dolomitic. Very faint streaked bedding and some moderately distinct laminae.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
921.0	923.0	Some fine dark brownish-gray dense to very fine crystalline streaks in upper part. Fairly regular thick to some thin parting. Oil shale: Dark brownish gray and grayish brown, dolomitic. Faint streaked bedding and some very faint laminae. Fairly regular thick to medium parting. Very rare fine dense medium brownish-gray streaks.
923.0	926.0	Oil shale: Dark to medium brownish gray and grayish brown to tan and buff, dolomitic in darker parts to slightly calcareous in lighter parts. Faint laminae and streaked bedding with very distinct 1- to 3-inch lighter zones. Regular to irregular, thick to rare thin parting. A 0.2-foot massive buff calcareous band at 923.5. An irregular vertical fracture with very fine calcite crusts in lighter zone at 925.2-925.4.
926.0	928.0	Oil shale: Dark brownish gray, dolomitic. Very faint streaked bedding and some very fine laminae. Irregular thick to rare thin parting; some irregular coarse hackly fracture. Common very irregular fine to thin vertical stringers of dense medium brownish-gray to almost neutral gray calcareous material. Sample of very dark oil shale with dense medium brownish-gray stringer from 926.8 feet: X-ray - illite, quartz, dolomite, calcite, analcite, feldspar, pyrite, marcasite.
928.0	929.2	Oil shale: Dark brownish gray to black, dark grayish brown to medium brown from 928.3 to 928.7; dolomitic. Very faint streaked bedding. Irregular to regular, thick to rare thin parting. Rare fine dark brownish-gray silty crystalline blebs in middle part.
929.2	930.7	Oil shale: Dark brownish gray, calcareous. Very faint very fine laminae and streaked bedding. Slightly irregular to very regular, thick to very thin shaly parting. Very abundant fine grayish-brown crystalline calcite laminae and streaks below 929.7--some with vertical prismatic crystals. Sample of calcite lamina with some oil shale from 930.6 feet: X-ray - calcite; some quartz, illite, dolomite, analcite, feldspar, pyrite.
930.7	931.7	Oil shale: Dark brownish gray, slightly calcareous to dolomitic. Very faint very fine laminae and streaked bedding. Regular to irregular, thin to thick shaly parting. A high angle fracture with

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		very fine calcite crusts from about 930.9 to 931.3. Rare fine pyrite streaks and waxy black fossil fragments near base.
931.7	933.0	Oil shale: Dark brownish gray to black and some medium grayish brown, dolomitic to slightly calcareous. Faint streaked bedding. Some fine dark brownish-gray silty crystalline to dense streaks and blebs--commonly with pyritic rims. Irregular thick parting.
933.0	934.0	Oil shale: Very dark brownish gray, dolomitic. Very faint streaked bedding. Irregular medium to thick parting. Very rare very fine dark gray pyritic streaks and blebs.
934.0	935.2	Oil shale: Dark brownish gray, dolomitic. Very faint streaked bedding. Irregular to regular, thick to some medium parting; conchoidal fracture. Very abrupt change to lean oil shale at base.
		Sample of oil shale from 934.6 feet: X-ray - quartz, illite, feldspar, dolomite, calcite, dawsonite, pyrite.
935.2	936.2	Oil shale: Light to medium brownish gray and rare buff, dark grayish brown in lower 0.4 foot; dolomitic. Fairly distinct to very faint streaked bedding. Common small to fine dense tan dolomite nodules and streaks at 935.9-936.0.
		Sample of light to medium brownish-gray oil shale from 935.7 feet: X-ray - dolomite, quartz, calcite, feldspar, pyrite, illite.
936.2	937.1	Marlstone: Light brownish gray to buff, calcareous. Faint to moderately distinct streaked bedding. Rare fine light gray to buff slightly silty blebs and streaks with medium to dark gray rims. Thick massive tan to buff stringers at 936.4 and 936.9.
937.1	938.5	Oil shale: Dark to medium brownish gray in upper half, medium brown to tan in lower half; dolomitic to slightly calcareous. Faint to fairly distinct streaked bedding. Common small to fine, medium to dark grayish-brown, dense to silty crystalline blebs with dark gray to black rims at 937.9-938.2. A 2-inch nodular dense grayish-brown dolomite stringer with irregular open vertical fissures with very fine drusy dolomite near base.
		Sample of small dark dense to silty crystalline blebs in brown to tan oil shale from 937.9 to 938.2 feet: X-ray - dolomite, quartz, analcite, calcite, pyrite, illite, feldspar.
938.5	939.6	Oil shale: Medium to dark grayish brown and some tan, dolomitic to slightly calcareous. Moderately distinct to faint streaked

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		bedding. Rare small dark dense to silty crystalline blebs. A fine vermiform light brownish-gray stringer cuts most of interval.
939.6	939.7	Missing?
939.7	941.0	Oil shale: Medium brown to very dark brownish gray, dolomitic. Fairly distinct to faint streaked bedding. Rare small dense to silty crystalline blebs. A very irregular fine to thin dense brownish-gray stringer cuts most of interval. A 2-inch nodular dense grayish-brown dolomite stringer at 940.7.
941.0	942.3	Oil shale: Very dark brownish gray to some medium grayish brown, dolomitic. Moderately distinct distorted streaked bedding in upper 0.3 foot; very faint very fine laminae and streaked bedding in other parts. Irregular to regular, thick to rare thin parting. Very rare fine resinous to vitreous black streaks and blebs. A 1/2- x 1-1/2-inch dense tan dolomite lens near top.
942.3	943.9	Oil shale: Dark to medium grayish brown and brownish gray, dolomitic. Faint to fairly distinct laminae and some very faint streaked bedding; rare fine displacements. Regular to irregular, thick to thin parting. Some thin to 1-inch dense brown to brownish-gray dolomite laminae and bands. A thick injected dense tan stringer at 942.8.
943.9	945.4	Shaly marlstone: Medium to light brownish gray and olive gray (almost neutral), slightly calcareous. Faint to moderately distinct laminae. Fairly regular to irregular thick parting. Sample of almost neutral gray shaly marlstone from 944.1 feet: X-ray - dolomite, quartz, illite, analcite, pyrite, feldspar.
945.4	947.4	Oil shale and marlstone: Medium brownish gray and grayish brown to buff, slightly calcareous. Faint to distinct laminae and some streaked bedding; common very fine loop structures and displacements. Rare thin zones with common very fine disseminated crystals and crystalline streaks. A thin brownish-black woody plant fragment on parting surface at 945.6. A thin dense dolomite stringer at 947.0. Sample of buff marlstone with abundant very fine crystals from 946.9 feet: X-ray - calcite, dolomite, quartz, analcite, illite, feldspar.
947.4	949.0	Oil shale: Medium to light brownish gray and grayish brown, slightly calcareous. Fairly distinct to faint streaked bedding.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Grayer parts are slightly silty. A 1-inch dense grayish brown dolomite stringer at 947.7; irregular brown to tan dolomite stringers in lower 0.2 foot.
		Sample of medium to light brownish-gray oil shale from 948.2 feet: X-ray - dolomite, quartz, calcite, illite, feldspar, analcite, pyrite.
949.0	951.3	Oil shale: Very dark to some medium grayish brown and brownish gray, dolomitic. Faint laminae and streaked bedding. Irregular very thin to some thick shaly parting.
951.3	952.4	Oil shale: Medium to light brownish gray, medium brown in lower 0.2 foot, calcareous. Very faint streaked bedding in upper part to faint laminae with common very fine displacements in lower part. Some very fine silty streaks.
952.4	954.4	Marlstone and oil shale: Buff to light and some medium brownish gray, slightly calcareous to very calcareous. Faintly laminated to very faintly bedded. A 0.1-foot dense tan to buff calcareous dolomite band at 953.0.
954.4	956.4	Oil shale: Buff and tan to medium grayish brown, calcareous. Faint to distinct laminae; very common fine loop structures and displacements. A 1-inch massive calcareous dolomite band at 955.5.
956.4	957.4	Oil shale: Tan to grayish brown and some buff, dolomitic to slightly calcareous. Moderately distinct to faint laminae and streaked bedding. A thin dense dolomite stringer at 956.9.
957.4	958.4	Oil shale: Medium and rare dark grayish brown to some tan and buff, dolomitic. Faint to moderately distinct streaked bedding. A 1-inch dolomite band at 957.5.
958.4	959.4	Oil shale: Dark grayish brown, some very fine resinous to vitreous black streaks in lower part; dolomitic. Very faint streaked bedding. Some thin dense brown dolomite streaks near top. Some very fine silty crystalline (?) blebs and streaks in lower part.
		Sample of very dark oil shale with very fine resinous black streaks and some silty crystalline (?) streaks from 959.3 feet: X-ray - quartz, illite, dolomite, analcite, feldspar, pyrite.
959.4	960.2	Oil shale: Dark to some medium grayish brown, dolomitic. Faint streaked bedding and some laminae. A gar scale on parting surface near top.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
960.2	961.2	Oil shale: Medium grayish brown to tan and rare buff, dolomitic to slightly calcareous. Faint to moderately distinct streaks and laminae.
961.2	962.5	Oil shale: Medium and rare dark grayish brown to buff, calcareous. Faint to fairly distinct laminae and streaks; some very fine loop structures and displacements. Uneven sample split.
962.5	964.1	Oil shale: Medium and some dark grayish brown to tan, dolomitic. Faint to moderately distinct streaks and laminae. Rare small to 1-inch dolomite nodules and thin bands. A 1/2-inch medium gray slightly silty zone at 963.1.
964.1	965.3	Oil shale: Medium grayish brown to tan and some medium brownish gray, dolomitic. Moderately distinct to faint laminae and streaked bedding. An irregular 1-1/2-inch dense brownish-gray dolomite band at 964.8. Some small dense brown angular inclusions with black pyritic rims near base.
965.3	966.3	Oil shale: Medium to some dark grayish brown, dolomitic. Faint very fine laminae and streaked bedding. Rare fine to small dark dense angular blebs with pyritic rims.
966.3	967.3	Oil shale: Very dark brownish gray, dolomitic. Very faint streaked bedding. Slightly irregular thick to some thin parting. Some very fine silty crystalline (?) streaks (like 959.3 feet).
967.3	969.3	Oil shale: Dark to medium brownish gray (some very slight olive tint), dolomitic. Very faint streaked bedding. Irregular thick to some thin parting.
969.3	970.7	Oil shale: Medium to some dark brownish gray and grayish brown, dolomitic. Faint streaked bedding. Irregular thick to rare thin parting. Some fine gray silty crystalline streaks at 970.4. Sample of oil shale with fine gray silty crystalline streaks from 970.4 feet: X-ray - quartz, dolomite, analcite, illite, feldspar, pyrite, marcasite.
970.7	971.7	Oil shale: Very dark brownish gray, dolomitic. Very faint streaked bedding. Irregular thick to very thin shaly parting; slightly unctuous.
971.7	973.0	Oil shale: Dark brownish gray to medium grayish brown, dolomitic. Faint streaked bedding and some laminae. Irregular thick parting; some irregular core pieces.
973.0	975.0	Oil shale: Tan and some buff to medium grayish brown, calcareous. Faint to moderately distinct streaked bedding and some laminae.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
		Some small light to medium brownish-gray, massive to blebby nodules and streaks with very fine dark rims.
975.0	976.0	Oil shale: Tan to medium and rare dark grayish brown, slightly calcareous. Faint to distinct streaks and some laminae.
976.0	977.0	Oil shale: Medium to dark grayish brown, dolomitic. Faint to moderately distinct streaked bedding.
977.0	978.5	Oil shale: Medium to rare dark grayish brown and rare tan, dolomitic. Moderately distinct to faint streaked bedding.
		Some small dense brownish-gray dolomite nodules in lower part.
978.5	980.5	Oil shale: Very dark brownish gray, some dark to medium grayish brown in upper part; dolomitic. Very faint streaked bedding. Irregular thick to some very thin parting.
980.5	982.1	Oil shale: Medium to dark grayish brown, dolomitic. Faint laminae and streaked bedding.
982.1	983.5	Mudstone: Medium olive gray and some grayish brown, dolomitic. Very faint streaked bedding. Fairly dense and hard.
983.5	984.5	Oil shale: Grayish brown to tan and some olive gray, dolomitic. Faint to moderately distinct streaks and some laminae. Some small dense dolomite blebs and streaks in upper part.
984.5	987.1	Oil shale: Medium grayish brown to tan and some buff, calcareous to dolomitic. Distinct laminae and streaked bedding; common very fine displacements. Rare very small to fine dark blebs and streaks.
		Sample of tan to grayish-brown oil shale from 986.3 feet: X-ray - dolomite, quartz, feldspar, dawsonite.
987.1	989.3	Oil shale: Medium to very dark grayish brown, some tan in upper part; dolomitic. Faint streaked bedding; some distinct laminae in upper part. Rare tight high angle fractures with slight varnish-like coatings in lower part.
989.3	990.6	Oil shale: Very dark brownish gray to rare medium grayish brown, dolomitic. Very faint streaked bedding and some very fine laminae. Common very fine disseminated crystals in middle part.
		Sample of oil shale with very fine disseminated crystals from 989.8 feet: X-ray - quartz, feldspar, ferroan, dawsonite.
990.6	991.8	Oil shale: Medium brownish gray, some medium brown in lower part; dolomitic. Very faint streaked bedding; some moderately distinct laminae and bands in lower part. Rare tight high angle fractures with brown coatings.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
991.8	993.4	Oil shale: Medium to some dark brownish gray, dolomitic. Faint laminae to very faint streaked bedding.
993.4	994.4	Oil shale: Medium to light brownish gray and grayish brown, dolomitic. Faint streaked bedding and some laminae.
994.4	995.4	Oil shale: Medium to some dark brownish gray, dolomitic. Very faint streaked bedding and some laminae. Very rare fine silty crystalline streaks.
995.4	996.2	Oil shale: Medium brownish gray to some brown and tan, dolomitic. Very faint streaked bedding to faint laminae.
996.2	998.8	Oil shale: Tan and buff to medium grayish brown, dolomitic to slightly calcareous. Distinct to faint laminae.
998.8	1,000.0	Marlstone: Buff to some tan and grayish brown, slightly calcareous. Very faintly bedded with some fairly distinct laminae. Some gray mudstone laminae and bands in upper part.
1,000.0	1,001.0	Marlstone and mudstone: Gray, olive gray, and brownish gray to some buff; slightly calcareous to very calcareous. Fairly distinct laminae. Some fine gray silty streaks.
1,001.0	1,003.0	Mudstone: Buff and medium brownish gray, very calcareous. Fairly distinct buff marly layers and irregular brownish-gray silty laminae, streaks, and some fine vertical stringers. Sample of buff and brownish-gray mudstone from 1,001.8 feet: X-ray - quartz, dolomite, calcite, feldspar, dawsonite.
1,003.0	1,007.0	Mudstone and siltstone: Buff to brownish-gray marly mudstone with fine distinct laminae and streaks of gray siltstone; calcareous.
1,007.0	1,009.0	Marlstone and mudstone: Buff to brownish gray and grayish brown, slightly calcareous. Faint to some distinct laminae. Rare fine gray siltstone streaks. Irregular core pieces in lower part; uneven sample split.
1,009.0	1,011.4	Marlstone: Buff to some medium and rare dark grayish brown, calcareous. Distinct to very faint laminae and some irregular streaks and stringers; contorted zone at 1,009.4-1,009.6. Some fine brownish-gray to gray mudstone streaks and stringers.
1,011.4	1,014.0	Oil shale: Tan and some buff to medium grayish brown, slightly calcareous. Distinct to faint laminae and streaks.
1,014.0	1,017.0	Oil shale: Tan to medium grayish brown, some buff in upper part; slightly calcareous to dolomitic. Moderately distinct laminae and streaks. A very irregular thick to thin vermiform stringer of buff calcareous marlstone from 1,015.0 to 1,015.8; some buff marlstone nodules in upper part.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
1,017.0	1,018.0	Oil shale: Medium to some dark and light grayish brown and brownish gray, dolomitic. Faint to some moderately distinct laminae; common fine displacements and some irregular loop structures. A thin dense brownish-gray dolomite layer at 1,017.6.
1,018.0	1,019.1	Oil shale: Medium to some light and rare dark brownish gray, slightly calcareous to dolomitic. Faint laminae to very faint streaked bedding. Sample of medium brownish-gray oil shale from 1,018.7 feet: X-ray - quartz, dolomite, feldspar, calcite, ferroan, dawsonite.
1,019.1	1,026.0	Marlstone and mudstone (oil shale in part): Buff to tan and some medium grayish brown, calcareous to slightly calcareous. Faint to distinct irregular laminae and streaks. Common fine light brownish-gray to buff silty streaks, stringers, and small blebs.
1,026.0	1,028.0	Oil shale: Medium grayish brown and brown to tan and rare buff, a 0.1-foot dark zone near base; slightly calcareous. Distinct laminae and streaks.
1,028.0	1,029.3	Oil shale: Medium grayish brown, dark zone at 1,028.7-1,029.0; dolomitic. Faint laminae and streaks.
1,029.3	1,030.2	Oil shale: Very dark brownish gray, dolomitic. Very faint streaked bedding. Some fine dense dolomite streaks in lower part. Sample of oil shale from 1,029.6 feet: X-ray - quartz, feldspar, illite, dolomite, ferroan.
1,030.2	1,032.0	Mudstone and marlstone: Buff to some tan and grayish brown, calcareous. Faint to some distinct laminae. Fairly common fine light brownish-gray and gray silty streaks and stringers.
1,032.0	1,033.4	Oil shale: Grayish brown to tan and some buff, slightly calcareous. Faint to moderately distinct laminae and streaks; common fine displacements.
1,033.4	1,034.7	Oil shale: Tan and buff to medium grayish brown, slightly calcareous to dolomitic. Faint laminae and streaked bedding.
1,034.7	1,035.8	Oil shale: Medium to some dark grayish brown, dolomitic. Faint laminae and streaked bedding. Some thin dense brown dolomite streaks and small nodules near base.
1,035.8	1,037.8	Oil shale: Medium grayish brown, dolomitic. Faint laminae and streaked bedding.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
1,037.8	1,039.8	Oil shale: Medium to rare dark grayish brown and brownish gray, dolomitic. Faint streaked bedding and some laminae. Some very thin to fine gray silty streaks and blebs at 1,039.4-1,039.5. Sample of oil shale with gray silty streaks and blebs from 1,039.4 to 1,039.5 feet: X-ray - dolomite, feldspar, quartz, cryolite, analcite.
1,039.8	1,040.5	Oil shale: Medium grayish brown and brown to some tan, dolomitic. Faint laminae and streaked bedding. Rare fine gray to gray-buff silty streaks.
1,040.5	1,042.6	Marlstone: Buff to tan and rare grayish brown, slightly calcareous. Faint to some fairly distinct laminae. Some fine gray to gray-buff silty streaks in upper part. Sample of marlstone from 1,042.3 feet: X-ray - dolomite, quartz, calcite, feldspar.
1,042.6	1,044.7	Marlstone and oil shale: Buff and tan to medium grayish brown, slightly calcareous to dolomitic. Faint to fairly distinct laminae. (0.1 foot missing?)
1,044.7	1,045.7	Oil shale: Tan to medium grayish brown, dolomitic. Very faintly bedded in upper 0.3 foot; moderately distinct laminae in other parts.
1,045.7	1,046.7	Oil shale: Medium to dark grayish brown, dolomitic. Moderately distinct to very faint laminae and streaks.
1,046.7	1,047.7	Oil shale: Very dark brownish gray to some black, dolomitic. Very faint very fine laminae and streaked bedding. Slightly irregular thick to medium parting. Very rare fine resinous black streaks.
1,047.7	1,050.2	Oil shale: Dark to medium brownish gray, dolomitic. Very faint streaked bedding and some laminae. Irregular thick to thin parting.
1,050.2	1,051.9	Oil shale: Medium brownish gray, dolomitic. Very faint streaks and laminae. Irregular thick to thin parting; rarely slightly unctuous. Sample of brownish-gray slightly unctuous oil shale from 1,051.2 feet: X-ray - illite, dolomite, quartz, analcite, feldspar.
1,051.9	1,054.0	Marlstone and mudstone: Buff to light and rare medium brownish gray, slightly calcareous to calcareous. Faint streaked bedding in upper part to faint and moderately distinct laminae in lower part. Some short very tight high angle fractures in upper part.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
1,054.0	1,057.0	Marlstone: Buff to tan and rare medium grayish brown, slightly calcareous to calcareous. Faint laminae and some very faintly bedded bands.
1,057.0	1,059.0	Marlstone and mudstone: Light to medium brownish gray, slightly calcareous. Faint laminae and streaked bedding. Some fine gray silty streaks.
1,059.0	1,061.7	Marlstone: Light to medium brownish gray and some grayish brown, slightly calcareous to dolomitic. Faint to some moderately distinct laminae. Some to rare fine gray silty streaks.
1,061.7	1,062.7	Oil shale: Medium and some light brownish gray, dolomitic. Faint laminae and streaked bedding. Some fine gray silty crystalline streaks and blebs. Sample of oil shale from 1,062.2 feet: X-ray - dolomite, quartz, analcite, illite, feldspar.
1,062.7	1,063.7	Oil shale: Medium to dark brownish gray, dolomitic. Faint laminae and streaked bedding. Rare fine gray silty crystalline blebs and streaks.
1,063.7	1,065.0	Oil shale: Dark brownish gray to some black, some satiny luster; dolomitic. Very faint streaked bedding and very fine laminae.
1,065.0	1,067.5	Mudstone and marlstone (oil shale?): Medium gray to brownish gray, dolomitic. Faint streaked bedding and some very faint laminae. Sample of gray to brownish-gray mudstone from 1,066.6 feet: X-ray - dolomite, quartz, feldspar, pyrite, marcasite, illite, dawsonite.
1,067.5	1,069.0	Oil shale: Medium to light brownish gray, some buff near base; dolomitic. Faint to moderately distinct laminae.
1,069.0	1,073.0	Oil shale: Light and some medium brownish gray to buff, dolomitic to slightly calcareous. Faint to moderately distinct laminae; common fine displacements. Some very faintly bedded light brownish-gray mudstone in middle part.
1,073.0	1,074.0	Oil shale: As above. Irregular core pieces; uneven sample split.
1,074.0	1,082.0	Missing.
1,082.0	1,083.1	Oil shale: Buff and tan to medium grayish brown, slightly calcareous to dolomitic. Distinctly laminated. A very irregular vermiform stringer of massive buff marlstone extends through most of interval.
1,083.1	1,084.2	Oil shale: Medium grayish brown to very dark brownish gray, dolomitic. Moderately distinct laminae to very faint streaked

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Core samples from Humble Oil & Refining Company's Jumps
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From	To	Description
		bedding. Common fine to thick, irregular to vermiform buff marlstone stringers.
		Sample of dark brownish-gray oil shale from 1,083.9 feet: X-ray - quartz, feldspar, dolomite, calcite, ferroan, illite.
1,084.2	1,091.2	Oil shale: Medium brown and grayish brown to tan and buff, dolomitic to calcareous. Distinct to faint laminae and streaks. Some vermiform buff marlstone stringers.
1,091.2	1,093.5	Oil shale (?): Buff and tan to some brown and grayish brown, calcareous. Faint to moderately distinct laminae.
1,093.5	1,097.0	Oil shale: Tan and buff to medium brown, calcareous. Moderately to very distinct laminae; common very fine loop structures and displacements.
		Sample of buff to brown oil shale from 1,096.7 feet: X-ray - dolomite, quartz, feldspar, calcite.
1,097.0	1,098.2	Oil shale: Medium grayish brown to very dark brownish gray, dolomitic. Very faint streaked bedding. Some very fine crystalline streaks and specks in middle part.
		Sample of very dark oil shale with very fine crystalline streaks from 1,097.7 feet: X-ray - quartz, analcite, dolomite, feldspar, illite, ferroan.
1,098.2	1,098.8	Oil shale: Medium brown to tan and some buff, dolomitic to calcareous. Faint to moderately distinct streaks and laminae.
1,098.8	1,105.0	Marlstone (including some oil shale): Buff and tan to some medium brown and grayish brown, calcareous. Faint to distinct laminae. Some fine irregular to vermiform gray-buff to light brownish-gray very fine crystalline blebs, streaks, and stringers.
		Sample of buff marlstone from 1,104.1 feet: X-ray - dolomite, quartz, feldspar, calcite, analcite.
1,105.0	1,108.0	Oil shale and some barren marlstone: Brown and grayish brown to tan and buff, calcareous. Distinct to faint laminae; common fine loop structures and displacements in lower part.
1,108.0	1,110.3	Oil shale: Medium brown and grayish brown to tan, dolomitic. Moderately distinct laminae and streaks; common fine displacements.
1,110.3	1,111.2	Oil shale: Medium to some dark brown and grayish brown, dolomitic. Faint streaks and laminae. A 1-1/2-inch dense grayish-brown dolomite nodule near top.
		Sample of dense dolomite nodule from 1,110.4 feet: X-ray - dolomite; some quartz, feldspar.

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From	To	Description
1,111.2	1,113.5	Oil shale: Very dark to some medium brownish gray, dolomitic. Very faint streaked bedding. Irregular to fairly regular thin parting in lower part. Some very fine crystalline streaks and specks in darker zones (like 1,097.7 feet).
1,113.5	1,116.9	Oil shale: Medium brown and grayish brown to tan and some buff, slightly calcareous. Faint to distinct laminae; common fine displacements.
1,116.9	1,117.9	Oil shale: Medium to dark grayish brown and rare tan, dolomitic. Faint laminae and streaked bedding.
1,117.9	1,118.9	Oil shale: Medium brown and grayish brown to rare tan, dolomitic. Moderately distinct to faint laminae and streaks.
1,118.9	1,121.0	Oil shale: Very dark to medium grayish brown, dolomitic. Faint streaked bedding. Rare small black cherty lenses. Sample of dark grayish-brown oil shale from 1,119.4 feet: X-ray - dolomite, quartz, illite, analcite, feldspar.
1,121.0	1,124.0	Oil shale: Dark brownish gray, dolomitic. Very faint streaked bedding. Irregular thick to very thin shaly parting. Some irregular pieces of buff marlstone in lower part. Mixed up core. Sample of dark brownish-gray clay shale from 1,122.8 feet: X-ray - illite, quartz, feldspar, analcite, dolomite.
1,124.0 ^{2/}	1,130.0	Mudstone and marlstone: Light to medium olive gray and some buff to brownish gray, slightly calcareous to dolomitic. Faint laminae and streaked bedding; some massive bands. Some fine gray silty streaks in upper part. Sample of light to medium olive-gray mudstone from 1,124.3 feet: X-ray - dolomite, quartz, illite, analcite, calcite, feldspar, pyrite.
1,130.0	1,134.0	Shale: Medium olive gray, slightly dolomitic to calcareous. Faint streaked bedding. Irregular thick to rare thin parting. Very rare fine dark gray silty pyritic streaks. Sample of shale from 1,131.9 feet: X-ray - illite, quartz, dolomite, analcite, pyrite, feldspar.
1,134.0	1,136.0	Mudstone: Light to medium olive gray, slightly calcareous. Faint streaked bedding and some laminae.
1,136.0	1,137.0	Oil shale (shale and marlstone): Medium to some light and dark olive gray and brownish gray, dolomitic. Faint streaked bedding to some moderately distinct laminae. Irregular thick to thin parting in upper part.

^{2/} Core below 1,124 feet was not sampled according to lithologic units.

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Core samples from Humble Oil & Refining Company's Jumps
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From	To	Description
1,137.0	1,138.0	Oil shale (marlstone): Medium grayish brown to tan and some buff, slightly calcareous. Moderately distinct laminae; common fine displacements. Some thin to fine dolomite layers in lower part.
1,138.0	1,140.0	Marlstone: Buff to tan and some grayish brown, slightly calcareous. Faint to moderately distinct laminae and some irregular streaks.
1,140.0	1,142.0	Oil shale (marlstone): Medium and rare dark grayish brown to some tan and buff, dolomitic. Moderately distinct laminae and streaks.
1,142.0	1,143.0	Oil shale (marlstone): Medium grayish brown to some tan and rare buff, dolomitic. Moderately distinct laminae in 1- to 2-inch lighter and darker zones. Sample of grayish-brown to buff oil shale from 1,142.6 feet: X-ray - dolomite, quartz, feldspar, analcite.
1,143.0	1,145.0	Marlstone and oil shale: Buff and tan to grayish brown, slightly calcareous to dolomitic. Moderately distinct to faint laminae and streaks.
1,145.0	1,151.3	Oil shale (shale and shaly marlstone): Dark to medium brownish gray, dolomitic. Faint streaked bedding and some laminae. Some irregular thin shaly parting. Some 0.1- to 0.2-foot bands of dense faintly bedded to massive dolomite. Sample of dark brownish-gray shale from 1,151.0 feet: X-ray - illite, quartz, analcite, feldspar, dolomite, pyrite.
1,151.3	1,152.0	Oil shale (shaly marlstone): Dark to medium and some light brownish gray and grayish brown, dolomitic. Faint streaked bedding to fairly distinct laminae. Some fine to thin light brownish-gray oolitic limestone layers in lower part.
1,152.0	1,154.0	Oil shale (marlstone): Light to medium grayish brown and brownish gray, dolomitic. Faint streaked bedding; some moderately distinct laminae in lower part.
1,154.0	1,158.1	Oil shale (shale): Dark to medium brownish gray and olive gray, slightly dolomitic. Faint laminae and streaked bedding. Irregular thick to thin shaly parting.
1,158.1	1,160.3	Oil shale (marlstone): Medium to light brownish gray and some buff, slightly calcareous. Faint to moderately distinct streaks and laminae. A vertical fracture with very fine calcite crusts cuts most of interval.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Humble Oil & Refining Company's Jumps
Cabin corehole No. 1 (Con.)

From	To	Description
1,160.3	1,164.0	Marlstone: Tan and buff to some medium grayish brown, slightly calcareous to dolomitic. Moderately distinct to faint laminae and streaks.
1,164.0	1,170.0	Oil shale (marlstone): Medium grayish brown to tan and buff, calcareous. Moderately distinct laminae and streaks.
1,170.0	1,173.0	Oil shale (marlstone): Medium to some dark grayish brown and some tan to rare buff, slightly calcareous to dolomitic. Faint laminae and streaked bedding.
1,173.0	1,175.5	Oil shale (shaly marlstone and shale): Medium to some dark and light brownish gray and some medium to light olive gray, dolomitic. Faint streaked bedding and some laminae. Irregular thick to medium parting; some slightly unctuous parting surfaces. Sample of dark brownish-gray shale from 1,174.7 feet: X-ray - illite, quartz, dolomite, feldspar, pyrite, analcite.
Bottom of core.		

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